

POPULAR Computing WEEKLY

35p

25-31 August 1983 Vol 2 No 34

This Week

Electron review

Keith and Steven Brain take a critical look at the Electron and compare it with its more famous elder brother — the BBC micro. See page 14.

Premier

David Kelly talks to Premier Microsystems about its Dragon disc drive on page 13.

Noughts and crosses

Chris Moorhouse presents a simple noughts and crosses game for the Dragon 32. See page 25.

New releases

All the latest software games including *Arena III* from Lizard Games and *Battle of Britain* from Maincomp. See page 45.

★ STAR
Barrels & Ladders
on 16K Spectrum.
See page 10.
GAME ★

News Desk

NewBrain company crashes

GRUNDY Business Systems, manufacturers of the £234 NewBrain micro, has gone into liquidation.

The company becomes the first major micro manufacturer to collapse.

G Wheeler, Grundy's financial director, blames the crash on a "severe liquidity crisis".

For some time prior to the crash, NewBrain had kept a low profile and a number of future projects — such as compiled Basic for the machine — had to be shelved. The design team had also been cut — with only one of the original six development engineers being retained.

The NewBrain had a chequered career. Originally designed by Clive Sinclair, the project went first to the National Enterprise Board and the Newbury Laboratories, before being bought by Grundy. Finally launched in May last year, the machine featured only a black and white display.

Continued on page 5

The Mirror plans a launch into software

THE *Daily Mirror* newspaper is to enter the software industry.

The national newspaper plans to launch a range of titles for the Spectrum, Dragon and BBC machines in November.

Its development team — Jim MacKonoche, Bernard Grant and Richard Bolton — has been talking to a number of software houses over a period of months.

Those tentatively approached include Psion, Melbourne House, Quicksilva and Automata.

The idea is that new soft-

EXCLUSIVE

ware would be specially commissioned by the *Mirror* and sold under its own label.

But, *Daily Mirror* development manager Jim MacKonoche denied that plans to sell software were far advanced: "People are putting two and two together and getting three. As a company we are always showing interest in publishing ideas — particularly in areas of new technology."

Quicksilva's managing director Rod Cousins, how-

Continued on page 5

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Continued on page 40

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All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your own program returned you must include a stamped, addressed envelope.

Accuracy

Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

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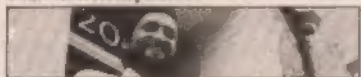
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Editorial

The Right Stuff by Tom Wolfe is a book which tells the true story behind the US manned space programme. It details the lives of the astronauts and their families with chilling precision.

It is hard for anyone in the UK to imagine the awe with which astronauts were regarded in the US during the 1960s. The Russians had stolen a march on the Americans, first with the launch of the Sputnik, then, on April 12, 1961, with the first manned orbit of the earth by Yuri Gagarin in Vostok 1. The astronauts selected for NASA's spaceships were seen not only as challenging Russia's dominance of space, but also as representing everything that was good about the American way of life. The first seven astronauts, and John Glenn in particular, took on a status somewhere between film stars and messiahs.

However, as *The Right Stuff* explains, behind the apple-pie image, the astronauts had as many human frailties, rivalries and fears as anyone else. They were special, certainly, but they did not all leap from the same 'crew-cut, all-American boy' mould as the media would have had you believe.

The Right Stuff not only tells you what it takes to become an astronaut, it also tells you what it was 'really like' to be an astronaut.

Movie buffs may like to know that film rights to the book have been bought by Chartoff-Winkler and United Artists.

Next Thursday

Rescue the damsel from the castle, but avoid the evil knight. Damsel in Distress, next week's star game for 16K or 48K Spectrum by Richard Bartlett.

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Software on cable from W H Smith

W H SMITH has announced it is to set up a new Cable Services Division, with the main intention of distributing games software by cable.

The service is planned to begin sometime in 1984 and is the result of a tie-up between W H Smith and an American company, The Games Network.

The Games Network operates a cable video games service in Los Angeles, and the Smith venture involves bringing that facility to the UK and Eire.

This will mean that, to begin with, games offered on the system will be of American origin. It is hoped, however, that as the scheme proceeds, software from British software houses will also be included.

The format of The Games

Network is that of a top 20 games list, which is regularly up-dated each month.

Subscribers will be supplied with a special games console with keyboard and internal memory — rather like a low-cost home micro — with which to play the games. At present, US subscribers to the Games Network pay about £10 a month for the service.

One advantage of the system is that, in principle, it can allow two-way communication with Smith's host computer, opening up areas such as multi-player interactive games, armchair-shopping and tele-banking.

Francis Baron, former chief executive of Guthrie International, has been appointed managing director of the new W H Smith cable division.

Electron head start for Smiths

W H Smith has gained a head start on its High Street rivals by tying up a deal to sell the Acorn Electron.

Over 100 of their shops will begin selling the £199 machine in mid-September.

See the *Electron* review page 14.

Mirror launch

Continued from page 1

er, confirmed *Popular Computing Weekly's* investigations: "Yes, we have spoken with the *Daily Mirror*, but in principle we would be against publishing games for anybody other than in our own identity."

NewBrain crash

Continued from page 1

A new Grundy research laboratory was opened in Cambridge by Information Technology Minister, Kenneth Baker in August last year.

A disc system announced recently for the NewBrain — giving access to the wealth of CP/M software — appears to have come too late to save the machine.

Psychology of language

MICHAEL Gruneberg, a senior lecturer in psychology at Swansea University has concluded an extensive series of deals for his language learning software.

His courses, designed to teach French, German, Spanish or Italian, are based on psychology rather than linguistics.

The series are designed to provide the holidaymaker or business person with a basic grounding and vocabulary of about 400 words.

His programs — the Gruneberg Linkword Language Courses will go into the following machines: BBC/

With no Microdrives on show on the Sinclair stand — let alone on sale — those wanting a mass storage option for the Spectrum could choose the £74 disc interface from Technology Research. Either standard 5¼ inch discs to accompany the interface (single: £230, double: £389) or a package including the Hungarian MCD-1 3 inch drives complete with interface (twin £327) was possible.

East London Robotics previewed a £39 electrocardiograph the *Ticker Tracer* to enable you to watch your heart working away.

Micronet 800 appeared at a ZX Fair for the first time, now that its Prism Spectrum modem is available.

On the debit side, several of the better known companies failed to put in an appearance — including Artic, Silversoft,



Electron (Acornsoft), Commodore 64/Vic20 (Audiogenic), Dragon (Dragon Data), Spectrum (Silversoft), Lynx (Camsoft), Atari (English Software) and Oric (Tansoft).

Mattel chops costs

MATTEL has chopped the cost of the 16K Ram expansion for its new £79 Aquarius home micro.

The price comes down from £49.95 to £29.95. The cost of the 4K Ram expansion remains unchanged at £19.95.

Yet, even so, Mattel is under pressure from dealers to reduce prices further.

Silica Shop, the Kent-based computer shop, is selling the 20K combination of Aquarius and 16K Ram pack for only £99. Commented Silica Shop's John Arundel: "It is a good machine, but with only 4K we thought people wouldn't look at it. With 20K it makes a more attractive package."

Imagine and Computer Rentals. In part compensation, three companies were present for the first time: McGraw-Hill, Arcade and Blaby.

As far as Spectrum was concerned, interesting bits and pieces included: *Apocalypse*, a wargame simulation from Redshift, *Draw*, a graphics utility from Melbourne House, *Bedlam* from AWA, *The Dungeon Master* from Crystal Computing, *Logix* from Virgin Games.

Microdrive latest

POPULAR Computing Weekly has still not received its two ZX Microdrives ordered on July 29.

Latest moves in the Microdrive saga are: Cheque cashed by Sinclair Research on August 10. Acknowledgement of order received on August 10. Days since order: 28.

Sweltering ZX fair

DESPITE being held at the height of the summer holiday season, the Eighth ZX Microfair still managed to attract a healthy attendance. Almost 7,000 people — slightly down on last time — braved the sweltering heat inside London's Alexandra Pavilion last Saturday.

Although there was little new on display — most companies are holding back for the *Personal Computer World Show* in September — what was there was interesting.

World first for Philips TV



PHILIPS claims its CS3890 26in colour television is a world first.

It is a teletext compatible tv with built-in thermal printer. At the touch of a button the

machine will provide a 100 x 75mm print-out of any teletext page.

Available now, the set will sell for around £699 — the price including three rolls of printer paper.

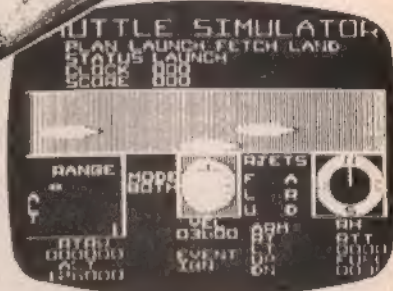
DRAGON 32 ASTRONAUTS URGENTLY NEEDED!

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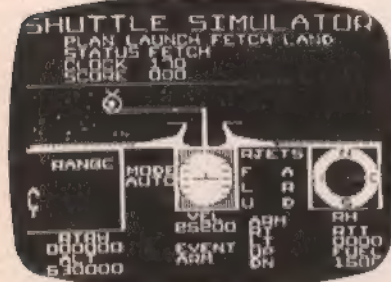
LAUNCH STAGE

Watch your instrument panel as you race upwards into space. Try to achieve a perfect orbit by controlling range, heading, and altitude with the right hand joystick...



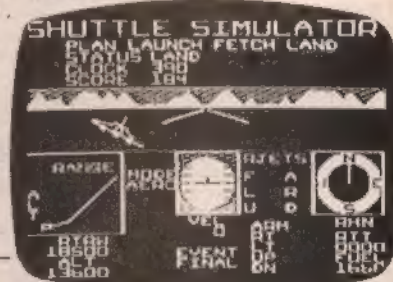
ARM STAGE

Open the loading bay doors and control the robot arm with the joystick. Position the arm on the correct place at the base of the satellite, press 'fire' to lock and withdraw the arm with the satellite attached. When safe in the bay close the doors and move to the next stage...



FINAL STAGE

Using the joystick guide the shuttle into the final approach. Watch out for the cross-winds, and keep a sharp eye on your instruments. If you make a mistake all that is left of you is a pile of scrap steel on the desert floor... It's not easy...



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Crashing program

I think I have found a genuine bug in the Spectrum game *Jetpac*. On several occasions when I have achieved high scores the program crashes and is wiped clean from memory. My high score at the moment is 118,700, but I still had two men. Is this the fault of the program or is it my computer?

Philip Slinn
80 St Johns Ave
Obelisk Rise
Northampton NN2 8RU

Since my high score on *Jetpac* is considerably lower, I'm afraid that I have no idea whether the program or the computer is at fault. Perhaps our readers will let us know if they have had any problems with *Jetpac*.

Fingers twitching

Has Sir Clive failed to realise the awesome implications of his latest move — introducing that infernal Microdrive? Can he be so thoughtless?

Thousands of Spectrum owners are now lying awake in their padded cells, unable to sleep. They can only stare vacantly into space, fingers twitching in the terrible knowledge that Artic can now write their next adventure (appropriately F) using 100K of Ram!

What hope is there for us? Clive, I ask you on behalf of us all to withdraw this device before it's too late.

S Rhodes
105 Crosslands
Caddington
Luton
Beds

Designer bug

Designer by Andrew Roberts was a welcome rare appearance of a useful program for the Oric (PCW, 4-10 August).

However, the program as printed had a bug in line 220 which prevented the redefined character from being stored in Ram. Since the variable *Tch(A)* is set to zero in line 200, anything by which it is multiplied in line 220 must be

zero, thus effectively erasing the character from memory.

Line 220 should therefore read:

```
IF CH(BA) = 1 THEN TCH(A) =  
TCH(A) + (2^(6 - B))
```

N Price
8 Pinewood Close
Gerrards Cross
Bucks

One letter ahead

In a footnote to Graham Marsden's letter (about IBM and HAL, PCW 11-17 August), you challenge readers to demonstrate the odds against the coincidence of "one letter ahead".

Well, I don't know what the odds are and I would have thought it depended on how you define the event. However, about 30 years ago, a certain Cedric Ailingham wrote a book in which he alleged he'd communicated with some Martians whilst hiking in the Scottish Highlands. The only word of Martian Cedric offered his readers was "gwf", meaning "yes".

Being more than a mite sceptical, I tried a "so many letters past 'yes'" calculation to see whether that was how he arrived at the word. Well, it very nearly works out (if you carry on beyond Z, starting at A again), as your readers should be able to calculate, even without a computer. But, while working on my rather uncharitable theory, I discovered that the French "oui" is exactly 16 letters past "yes".

That'll teach me not to believe in Martians!

A W Rowe
69 Longley Lane
Huddersfield HD4 6PR

A coincidence by any other name, eh? I'm still not quite sure how we progressed from HAL to believing in Martians, but you have got to admit it's a heck of a theory.

Planetoids megascore

Being a 16K Spectrum owner — four times owner having possessed three faulty Spectrums before my current model (so far, so good) — I was extremely interested in the *Hungry Horace* saga. I have now found a flaw in

Planetoids which has given me a megascore of 404,500. Can anyone beat it?

Patrick Sharkey
89 Chase Side
Enfield
London

Verify command

In response to a question from Andy Young (PCW 11-17 August), Ian Beardsmore suggested that the closest to a verify command on the BBC micro was *Cat. I should like to describe a better solution:

*LOAD"" 8000

Once the program has been saved, this command will try to reload it as normal but into Rom (8000+ hex) and not into Ram, leaving the original

program intact. The advantage being that all errors are checked — including the block zero bug — unlike *Cat — and, if the program does not *Load correctly, it can be resaved from Ram as normal.

I should also like to put in a plug for our local BBC user group which meets on the third Monday of each month in the Computer Room (above main entrance), Lord Lawson School, Portobello Road, Birtley, Co. Durham. The next meeting will be on 19 September.

Finally, thanks to Jeremy Ruston for his interesting assembler series, although a few more examples would be nice.

Gary Alderson
30 Windsor Road
Birtley
Chester-le-Street
Co. Durham DH3 1HY

Altered sound waves

I was interested to try out Steve Lanthrop's program *Sound Waves* for Spectrum (PCW 4-10 August, 1983).

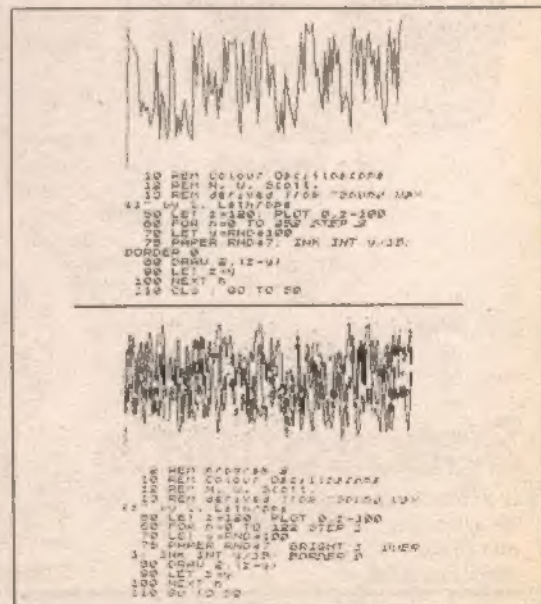
I enclose some slight alterations to his program that offer a more realistic type of sound waveform as might be seen on an oscilloscope, with colour added — the colour can be removed by substituting in Line 75 ... Paper 0: Ink 7:

Border 0.

Program 2 offers a variation on this.

Both programs obtain their Sound input from the computer, and therefore need no external signal.

N W Scott
18 Harrop Road
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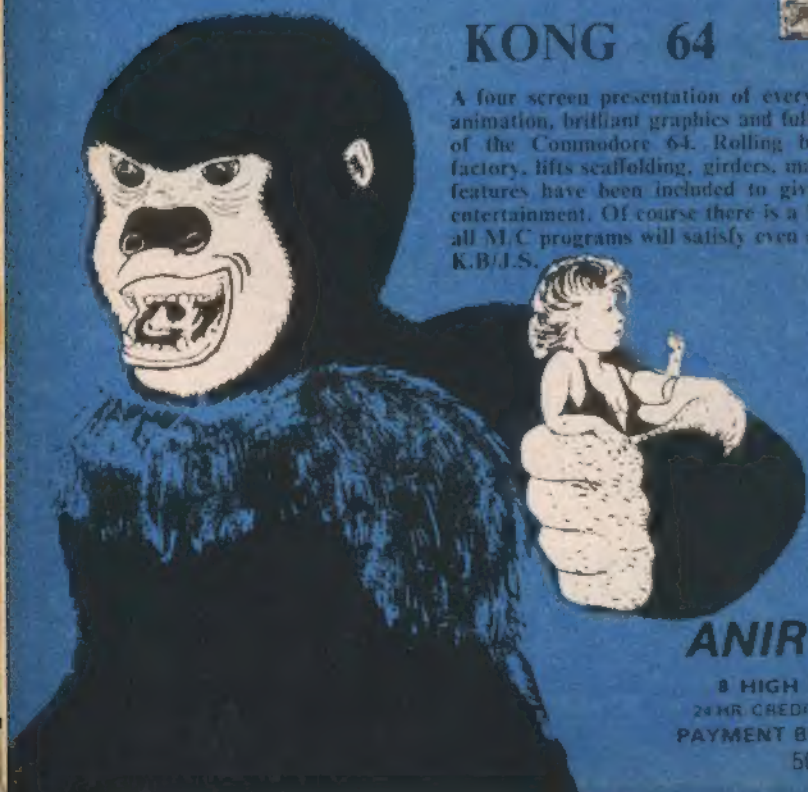


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Barrels and Ladders

A new game for 16 or 48K Spectrum by David Millington

Barrels and Ladders will run on either Spectrum. The play area consists of four floors interconnected by ladders. You control a man who has to rush from floor to floor collecting the red barrels that are lying around, and pile them up on the light blue platform on the bottom floor. Only one barrel can be carried at a time. Your task is made much more difficult by the patrols of green monsters which wander back and forth, trying to cut you off. They cannot be killed but must be avoided at all costs.

At the beginning of the game, you have three lives. A time line is shown at the top of the screen, and the score awarded for each barrel collected is based on the time remaining. Of course, if time runs out, you

will lose a life. When all 12 barrels have been collected, the game progresses to a second more difficult level, and so on. Your man is controlled using the left and right cursor keys, and the 'O' key to climb and descend ladders. You should have no trouble in beating my high score of 1083.

Finally, if you want to make the game harder still, try removing the statement `Let mf = Not mf` from line 305.

The Program

The program is written mainly in Basic, with a short machine code subroutine to animate the green monsters. When entering the program, the letters A to E in

quotes should be taken as the corresponding graphic character.

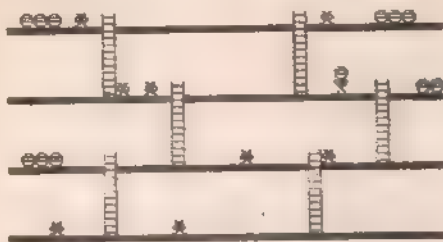
100-150	Move man along floors and pick up barrels
200-260	Climb/descend ladders
300-310	Decrement time and move monsters
400-430	Add barrel to pile and increase score
435-510	Next sheet
700-730	Lose life and end of game
1000-1050	Draw screen
2000-2500	Set up variables and initial positions of monsters and barrels
9500-9600	Load machine code and UDG's from data statements (note that line 1000 prevents the machine code from being loaded every time the program is run)

The machine code occupies addresses 32000 to 32500 and the first part of the printer buffer is used to store the positions of the monsters.



TIME

SCORE:0



```

1 REM *****
2 REM : BARRELS AND LADDERS :
3 REM : @ D.MILLINGTON 1983 :
4 REM *****
5
10 GO TO 1000
100 IF ATTR (1,X) > 50 THEN GO TO 700
105 IF INKEY$="" THEN FOR I=1 TO 30
110 PRINT AT 1,X," " IF b/ THEN
115 IF (I THEN PRINT AT 1,X, IN
120 IF b/ THEN IF ATTR (1-2
125 THEN PRINT AT (1-1,X) INK
126
120 LET X1=X+(INKEY$="8")-(INKE
121 Y$="5")
121 IF I=20 THEN IF X1=20 THEN
122 LET X1=X
122 IF b/ THEN IF ATTR (1,X1)=5
123 THEN LET X1=X
123 LET X=X1
124 IF X=1 OR X=32 THEN LET X=
125 X-30N X GO TO 700
126 LET (I=0 IF ATTR (1,X) =57
127 THEN LET (I=1
128 IF INKEY$="0" AND (I THEN G
129 O TO 200
130 IF ATTR (1,X)=50 THEN GO TO
131 700
131 IF ATTR (1,X)=55 THEN LET b
132 =1: LET b$="": BEEP .05,0: BEE
133 P .05,40: BEEP .05,40
134 PRINT AT 1,X,"@: IF b/ THEN
135 PRINT AT (1-1,X) INK 2;"D"
136 BEEP .03,20-1
137 IF b/ THEN IF I=20 THEN IF
138 X=25 THEN GO TO 400
139 GO TO 300
140 LET Z=USR 32000
141 IF ATTR (1-1,X)=57 THEN FOR
142 I=1 TO 4 STEP -1: GO TO 220
143 IF ATTR (1+1,X)=57 THEN FOR
144 I=1 TO 4
145 PRINT AT 1,X,"@
146 BEEP .02,20-1
147 PRINT AT 1,X; INK 1;"A"
148 NEXT I
149 LET (I=1 GO TO 140
150 DRAW INVERSE 1; INK 0;-1,0:
151 LET (I=-1: IF (I=0 THEN PAIR
152 T AT 1,0: FLASH 1;"TIME UP": GO
153 TO 700
154 BEEP .02,INT (PEEK 23672/8)
155 : LET b$=NOT b$: IF b/ THEN LET
156 Z=USR 32000
157 GO TO 90
158 LET b$=b$+1: READ I,2: PRIN
159 T AT 1,2, INK 2;"D": AT (1-1,X);
160 : LET b/0: LET b$="D"
161 DATA 20,25,26,27,20,28,20,2
162 9,20,30,20,31,15,30,19,29,19,28,
163 19,27,15,30,18,28
164 415 LET SC=SC+I*(NO/2-3): PAIR
165 T AT 0,25; BRIGHT 0: PAPER 0; SC
166 420 BEEP .2,5: BEEP .2,10: BEEP
167 .2,3
168 PLOT 40,153: DRAW INK 1;150
169 : LET I=150: PLOT INVERSE 1;
170 INK 1,201,153
171 IF b<12 THEN GO TO 300
172 PRINT AT 1,0: PAPER 1; INK
173 7;"WELL DONE,BUT YOU WON'T ESCA
174 PE US NEXT TIME...":
175 PRINT
176 FOR I=12 TO 23 STEP 2
177 450 FOR J=-4 TO 3: LET Z=USR 32
178 000: BEEP .1,I+4-ABS J: NEXT J
179 460 NEXT I
180 470 FOR I=50 TO -30 STEP -3: LE
181 T Z=USR 32000: BEEP .04,I: NEXT
182 I
183 500 LET NO=NO+2
184 510 GO TO 1000

```

```

700 PRINT AT 1,X,"@: IF b/ THEN
701 PRINT AT (1-1,X) INK 2;"D"
702 RESTORE 710: FOR I=1 TO 10:
703 PRINT OVER 1,1,X; INK 1/2,00
704 READ P,1: BEEP .1; NEXT I
710 DATA 2,3,1,2,3,5,2,3,4,3
715 PRINT @: AT 1,(2+2-1),4,3
720 LET (I=12-1: IF (I=0 THEN LET
721 Z=USR 32000+USR 32000: GO TO 22
722
720 PRINT INK 3; AT 2,7;"YOU GOT
721 54400 (NO-8) BARREL ("S" AN
722 0 69<1)
725 FOR I=0 TO -50 STEP -5: BEE
726 P .2,I: NEXT I
726 PRINT AT 10,0, BRIGHT 1,"
727 PRESS ANY KEY TO PLAY AGAIN"
730 PAUSE 0: RUN
1000 IF PEEK USA "2" < 129 THEN G
1001 SUB 9500
1001 LET b$="B": LET (I=3: LET D
1002 0=8: LET SC=0
1002 PAPER 7: INK 0; BRIGHT 0: P
1003 LASH 0: OVER 0: INVERSE 0: BORDE
1004 R 6: CLS: PRINT AT 0,20: PAPER
1005 5; BRIGHT 1;"SCORE:"; SC
1006 1003 FOR I=5 TO 21 STEP 5: PRINT
1007 AT 1,0: INK 3;" " NEXT I
1008 1004 PRINT INK 5, AT 21,25,
1009 " " AT 20,26, INK 2,
1010 1005 RESTORE 1050
1010 FOR J=1 TO 5
1011 1020 READ X,Y
1012 1030 FOR I=Y TO Y-5 STEP -1: PNI
1013 NT AT X; INK 1;"A"; NEXT I
1040 NEXT J
1050 DATA 7,20,22,20,12,15,27,15
1060 21,10,7,10
1070 2010 LET b/0: LET b/1: LET b$=
1071 0
1072 2020 FOR I=1 TO (2: PRINT @; "E
1073 " " NEXT I
1074 2100 DATA 15,1,10,20,5,1,5,27
1075 2110 FOR I=1 TO 4: READ Y,Z
1076 2120 PRINT INK 2; AT Y,2;"ODD"
1077 2130 NEXT I
1078 2150 RESTORE 2100
1079 2190 POKE 32004,NO
1080 2200 FOR I=0 TO NO-1
1081 2210 LET I=INT (I/(NO/4))+5+5: E
1082 2220 OKE 23205+I+2,I
1083 2220 LET X=INT (RAND*22)+3
1084 2225 IF I=20 THEN IF X=20 AND X
1085 2230 THEN GO TO 2220
1086 2230 IF ATTR (1,X-1)+ATTR (1,X)+
1087 2230 ATTR (1,X+1) < 150 THEN GO TO 222
1088 0
1089 2250 POKE 23207+I+2,X+120:(X+16)
1090 2255 PRINT AT 1,X; INK 4;"C"
1091 2260 NEXT I
1092 2270 LET (I=0: LET (I=20: LET X=2
1093 2
1094 2275 IF ATTR (1,X)=57 THEN LET (
1095 I=1
1096 2275 PRINT AT 1,X,"@
1097 2280 RESTORE 410: FOR I=1 TO 60:
1098 READ P,P: NEXT I
1099 2300 PRINT AT 1,0;"TIME: " PLO
1100 T 40,153: DRAW INK 1;150,0: PLOT
1101 INVERSE 1; INK 1;201,153
1102 2310 LET I=150
1103 2310 PRINT AT 2,11; FLASH 1;"GET
1104 READY"
1105 2405 FOR I=1 TO 150: NEXT I
1106 2410 PRINT AT 2,11," "
1107 2500 GO TO 100
1108 9500 RESTORE 9510: FOR I=USR "a"
1109 TO USR "e"+7: READ X: POKE 1,X:
1110 NEXT I
1111 9510 DATA 129,129,255,129,129,12
1112 9,255,129,60,60,24,126,153,24,36
1113 ,66,102,60,126,153,255,60,36,195
1114 ,60,66,255,129,255,129,66,60,100
1115 ,100,90,60,24,24,36,66
1116 9515 FOR I=32000 TO 32150: READ
1117 X,P: POKE 1,X: NEXT I
1118 9520 DATA 33,0,215,6,0,197,62,22,
1119 215,126,79,35,215,126,230,31,216
1120 ,62,16,215
1121 9530 DATA 62,0,215,62,32,203,110
1122 ,40,10,62,16,215,62,1,215,62,144
1123 ,203,162,215
1124 9540 DATA 126,230,126,7,254,1,40
1125 ,2,62,255,67,126,230,31,130,95,7
1126 ,4,205,130,126
1127 9550 DATA 254,60,32,3,123,130,95
1128 ,67,205,130,126,254,57,32,2,203,
1129 ,246,123,130,71
1130 9560 DATA 205,130,126,254,58,40,
1131 ,11,123,254,0,48,6,254,31,40,2,24
1132 ,4,126,230
1133 9570 DATA 128,119,126,230,192,17
1134 ,9,119,62,22,215,121,215,126,230,
1135 ,31,215,62,16,215,62
1136 9580 DATA 4,215,62,145,215,35,19
1137 ,3,16,132,201,225,197,121,15,15,1
1138 ,5,79,230,224,160
1139 9590 DATA 111,121,230,3,230,55,1
1140 ,63,126,193,225,201
1141 9600 RETURN

```


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A claim to fame

David Kelly talks to Peter Rihan and John Hooker of Premier Microsystems

Premier Microsystems' claim to fame is that it has produced the first disc system for the Dragon 32 — considerably in advance of Dragon Data's own.

The company was formed almost three years ago by John Hooker and Michael Bedford. The pair began by writing software for the Casio 502P programmable calculator. Then came material for the UK101 and Tandy machines.

Peter Rihan, who is now chairman of the company, joined as a hardware expert and helped develop a range of add-ons for the UK101 and Tandy.

When the Dragon was announced a year ago, its similarity to the Tandy Color Computer put Premier in a good position to support it. Says John: "We saw the opportunity and grabbed it."

Premier is now heavily involved with the Dragon Data machines — as a dealer and recognised service agent and, more importantly, as the designer and manufacturer of a range of hardware and software add-ons, utilities and games.

First reactions to the Dragon 32 last August were favourable — a nice modern processor, a good keyboard, well built internally and says John, "We got a constant supply of them from day one."

"At that time the graphics were decent — not perfect by a long way — but decent. Also the Dragon had 32K."

In the pipeline

"We felt at the time that the only real competition for it was the BBC and Dragon has now sold upwards of 100,000 machines."

Premier realised that, with its keyboard, the Dragon had the potential to be a small business system. Peter and John had already developed the Rom Dos and Vorlex disc systems for the UK101, so the idea of designing and manufacturing their own disc system for the Dragon didn't seem too impossible.

"When we first went with the Dragon, we talked to Dragon immediately about a disc system," says Peter. "They said they were in the pipeline — and due in October. Then in September it transpired that the disc drives had been delayed so we began preliminary work."

"When nothing had appeared by the following year, we decided to go ahead and produce our own system." Premier set a deadline of March because at that time the Dragon drives were planned for April. John and Peter tried to go for a professional system which could compare favourably with the best of the disc systems that operate using an extension of the existing Basic.

While working on the disc system, they realised that the Dragon needed an

assembler/editor. Nothing had materialised by the time one was needed, so John wrote his own assembler/disassembler/monitor — called *Encoder 09*.

The Premier Delta disc system has now been on the market for over five months and, at that time, close on 1,000 of the units have been sold — getting on for one percent of Dragon owners. John reckons this may have seriously damaged the impact that Dragon's own disc system will have — when it is launched.

At present, the Delta disc system uses Canon drives, but Premier will soon sell a system based on Teac half-height drives — hopefully at around the same price.

A double-density system is also planned. It will be launched in September in conjunction with disc manufacturer and distributor, Cumana.

To support the two Delta disc systems, Premier has commissioned a range of software packages — stock control, data base management and accounting.

Premier also plan to sell a complete system comprising Dragon, monitor, printer, disc drive and software — all for well under £1,000.

John has just finished writing a Dragon *Toolkit* cartridge which will give the machine 36 extra Basic commands. It will incorporate a full screen editor, eight programmable keys, more low-res graphics commands, global search and replace. *Goto n* where *n* is a variable, page commands for listing on-screen and graphics handling to store and call up to 24 different screens of graphics.

"More and more, our software is veering away from games," says John, "towards utilities. I'm quite convinced that the *Toolkit* program will outsell any of our games in the first week."

Next comes a sprite graphics board hardware-software combination giving the

Dragon 16 colours and 32 moveable shapes up to 32 x 32 characters in size. This is planned for September and will cost £99.95.

Ministrelle is another project — a six voice stereo sound card. Normally, producing sound on the Dragon hangs up the processor for the duration of the sound. Premier's sound card will have its own processor. A version of the Logo language is also planned for release in September.

The next big step for Premier, as far as the Dragon is concerned, comes when Dragon Data launches the Dragon 64.

Says Peter: "The advantage of the 64 is that it is a soft machine — by that I mean that it only comes into its own with a disc operating system to load a language or other software. 'Loading a 64K file from cassette is no fun.'"

"In a sense," says John, "the Delta disc system is a lowish-level system because it operates through an extension of the existing Basic language on the Dragon. The next step up is a stand-alone operating system."

Rolls in a Mini

Unlike Z80-based machines where the CP/M operating system has become a standard, there is no direct equivalent for the 6809 which the Dragon uses.

There are two contenders — Flex and OS9. Dragon Data intends to put OS9 on to the 64 machine. Premier has chosen Flex. Explains John, "OS9 hasn't been going as long as Flex and was designed to be a multi-tasking system."

"We think Flex is better because there is more software available under the system and because we think OS9 may turn out to be a little too sophisticated for the Dragon."

"OS9 on the Dragon is a little like putting a Rolls-Royce engine in a Mini — it is difficult to see how Dragon Data will make use of OS9's multi-tasking capabilities. They seem more suited to Dragon's planned business machine based on the 68008 chip."

Premier has its own thoughts. The company will support the Flex operating system on the 64K Dragon, using either its single or double-density Delta disc units.

"With Flex everything in the Dragon — Basic — goes out of the window," explains Peter. "Instead, the Flex operating system sits above 48K, giving you 48K of work-space. It will give the Dragon owner access to an enormous range of standard languages and software."

"We are currently in negotiation with Technical Systems Consultants in the US to licence our implementation of Flex."

"We think there is still some mileage in the Dragon yet. That is not to say we aren't looking around for another machine to support which will sell in Dragon-like quantities. We haven't found it yet though — neither the Lynx nor the Oric appeals."

"We are also interested in writing system software for other people, possibly for incorporation in new machines — simply because that is the type of work which we have found most rewarding."



How does it compare?

Keith and Steven Brain see how the Acorn Electron measures up to the BBC micro

At last Acorn's long-promised Electron has arrived on the scene. But, what facilities does it provide and how does it compare with the competition, now that the whole standard of micros has improved dramatically while prices are dropping through the floor?

Perhaps it is rather unfair to compare the Electron with the BBC Model B, at twice the price, but, as everyone has anticipated that it will have much in common with the BBC machine, it is inevitable that we must consider how close it is, what features have been trimmed off in the interests of economy, and how well it can stand up in its own right. Although the following observations are based on an examination of a late prototype model, it seems unlikely that there will be any major revisions to the design at this late stage.

To start with, the Electron very sensibly uses a real full-depression typewriter-style keyboard and an external power supply. These dictate that the shape and size of the package is very similar to that of many other recent micros, such as the Commodore 64 and the Lynx. The keyboard is of the standard Query type with 55 keys, including a full-sized space-bar, but many of these keys are multi-function.

In addition to the usual *Shift* and *Ctrl* keys, a *Func* key is also provided. In a major departure from previous Acorn practice, this can be used in conjunction with 29 of the keys to enter whole Basic keywords. These Basic keywords are clearly marked on the front edge of the

key-caps, so that the user does not suffer from the 'treble-vision' syndrome associated with the closely packed legends of the Spectrum.

A nice touch is that you are not forced to enter the keywords in this way, if you are used to the BBC machine, as the equivalent command abbreviations are also accepted. Although the extra line of red function keys provided on the BBC are not included, their action can be reproduced by using the *Func* key in combination with the number key 0 to 9.

The transformer has been kept separate and is built into the mains plug. This neatly avoids overheating problems, but unfortunately it makes the whole plug unit large and unwieldy — we feel a separate box would have been more sensible.

The power cable enters on the right-hand side of the machine, while on the left-hand side are the sockets for cassette, UHF to TV, RGB monitor and black and white monitor. You will find that these are labelled clearly, but only if you turn the machine upside down!

At the back of the case the bus lines are brought out to an edge connector for expansion purposes. This connector projects from a recess at the back of the Electron and looks rather vulnerable, although we understand that it will be



Keith Brain

from the main board by a plastic divider. The main board has a 8502A CPU running at 2MHz, a 16K Rom containing the Basic, a 16K Eprom containing the operating system, and four 64K x 1 bit Ram chips (giving a total of 32K), but the most interesting feature is a huge 68 lead ULA on the right which has taken over the functions of several of the chips in the BBC. A particular significance is the fact that it has replaced the standard 6845 video controller and internal timers, so that a number of operations possible on the BBC cannot be carried out on the Electron.

The Electron uses the BBC dialect of Basic, which you tend to either love or hate, according to your leanings towards

Steven Brain



adequately covered in production versions. A large bolt-hole at each end promises secure anchorage points for add-ons, but very serious omissions from the specification of the Electron are printer and joystick interfaces.

Inside the case are two circuit boards. On the right-hand side is the switched mode power supply which is separated

'structured' languages or simplicity in use. The designers have taken care to make the Electron as compatible as possible with the BBC, and the memory maps are identical. Of the 32K of Ram, 3.25K is used by the operating system, and 0.25K reserved for machine code routines, leaving 28.5K available for programs, graphics and data.

Seven modes are available: modes 3 and 6 are two-colour text only (80 and 40 characters by 25 lines), mode 4 gives two colours with a resolution of 320×256 , mode 5 gives four colours with a resolution of 160×256 , mode 2 gives 15 colours with a resolution of 160×256 , mode 1 gives four colours with a resolution of 320×256 and mode 0 two colours with a resolution of 640×256 . Of the modes available on the BBC only the teletext mode (7) is not implemented.

A major quirk of the Electron is the way Ram is organised. In the interests of economy, four 634K \times 1 bit Ram chips have been used, but as these can only be read four bits at a time, memory access time is virtually doubled so that the Electron is dramatically slower than the BBC. Talking of speed in the context of micros can easily become rather like discussing top speeds of exotic cars when there is a 70mph speed limit. However, in this case, we believe that we are not talking about exceeding reasonable speed limits, but rather about almost doubling the time taken to perform routine tasks.

Incorporation of the video driver routine into the ULA has further slowed down execution of graphics, so that although many games designed for the BBC will run on the Electron they proceed at less than half the speed, with very significant effects on their appeal. Although the personal micro-world is intensely price-sensitive, perhaps this is an unfortunate case of spilling the ship for a ha'porth of tar.

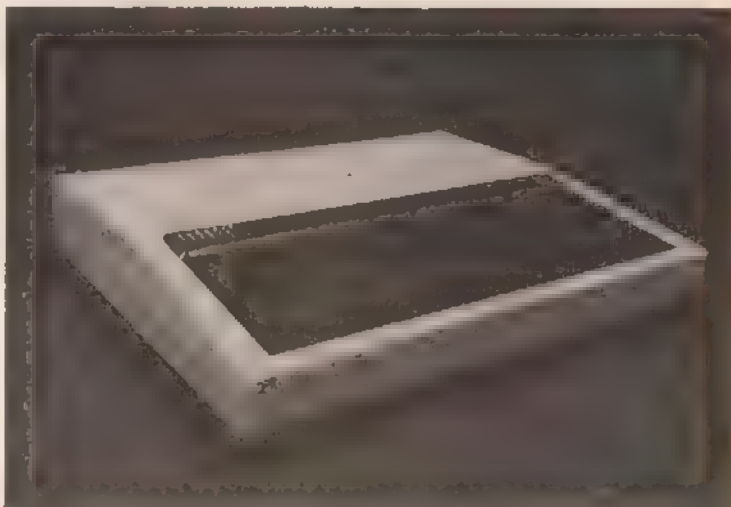
The Electron will only produce one sound channel at a time, even though it accepts the channel parameter to make its

software compatible with the BBC. The same principles apply to the cassette interface, where you can only *Load* and *Save* at 1200 baud, and, even though the system accepts the *Tape 3* command, it continues to work at 1200 baud. The *Envelope* command is retained, but is more limited in scope than that on the BBC. No provision is made for sideways Roms, although the Basic chip could be replaced, should you want a dedicated word-processor for example.

We ultimately found ourselves rather uncertain as to which segment of the market Acorn are aiming for with the

Electron. The most obvious area seems to be education, where the high specification and price-tag of the Model B seem rarely justified by their actual practical applications in schools. It is possible that this alternative machine will generate internal competition with the Model B, rather than increased sales, although we certainly welcome any approach which provides more children with increased 'hands-on' micro experience rather than limited demonstrations.

The technical elegance of the Basic and operating system of the Electron may appeal to the 'serious' home user but they will soon find themselves in need of

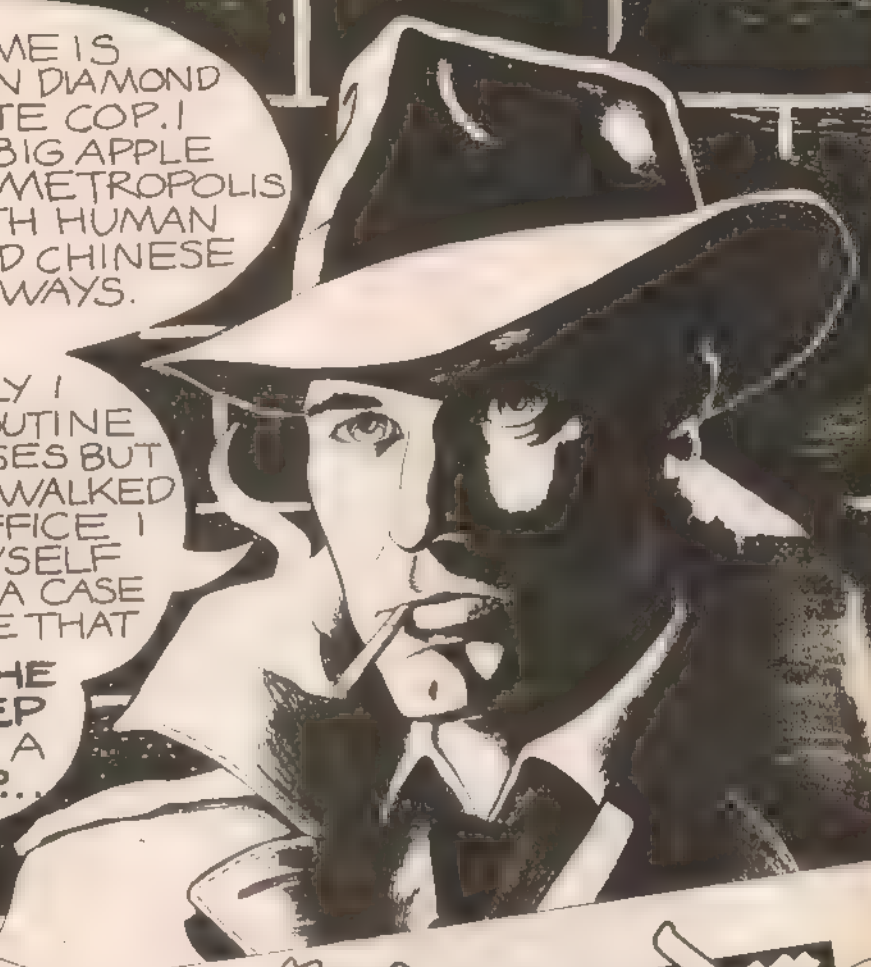


add-ons, most urgent of which is a printer interface. Indeed it seems rather strange that any micro-manufacturer should feel at this stage that a printer will be an unusual option. Although Sir Computers of Cardiff will provide Electron add-ons, including a printer interface and A/D converter (PCW, 19-24 August), the user may soon find that his Electron needs to look like a 'souped-up ZX81' festooned with 'bolt-on goodies' to meet his needs, and that he would have been better off buying a Model B in the first place.

For the third large group of users, who just like to play games on their machines, the limited sound and graphics capabilities of the Electron seem poor value against the current competition. Although extensive use of the Electron in schools will probably influence parents, we feel that discerning children may well rebel against what may seem at first sight the obvious choice for a home computer. ■

MY NAME IS
DIAMOND, DAN DIAMOND
 I'M A PRIVATE COP. I
 WORK THE BIG APPLE
 A SEETHING METROPOLIS
 FILLED WITH HUMAN
 MISERY AND CHINESE
 TAKEAWAYS.

NORMALLY I
 ONLY DO ROUTINE
 DIVORCE CASES BUT
 WHEN **SHE** WALKED
 INTO MY OFFICE I
 FOUND MYSELF
 INVOLVED IN A CASE
 SO STRANGE THAT
 IT MADE THE
BIG SLEEP
 LOOK LIKE A
CAT NAP...



NEWS HUNT WINS GRAND PRIX

At yesterday's Monaco Grand Prix, a hunting party strayed onto the track at the climax of the race. Cars were halted as the hounds rampaged around the circuit. "The whole place has gone to the dogs," one driver was reported as saying. The race was restarted, riders and drivers battled bitterly around the course before the Hunt thundered past the finishing line to take the chequered flag (it hasn't been seen since).

PLAYER WINS OPEN

Eagle eyed spectators were privileged to score



Salamander

SOFTWARE

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FOR THE

PRIVATE DETECTIVE DISAPPEARS

Police are baffled by the disappearance of Dan Diamond. He was last seen approaching the eerie edifice known as Franklin's Tomb, but the authorities are completely unable to find any trace of him. Citizens are asked to report any information relating to his disappearance immediately. For further details, buy FRANKLIN'S TOMB, a new adventure game for the DRAGON 32 and 48K ORIC-1. This adventure comes complete with a 24-page illustrated Case File £9.95 from BOOTS, SPECTRUM.COM-BUYS FOR ALL WEB-CONVEYORS

2 DEAD IN EVEREST TRAGEDY

The Everest Expedition ended in tragedy yesterday as Carl and plunged down a to a grisly death. the expedition was quoted as "Yak". Continued

COLD WAR XARG ESCAPES

Thousands dead in Ice Storm. Modulus the

In the firing line

Peter Bartley explains how to fire missiles in the second of a six-part series for the Vic20

Last week we saw how to create a randomly moving object on-screen. This is pretty useless unless we can do something with it ourselves. How about creating our own "blob"?

To move our object around, we must input information via the keyboard. There are two ways of doing this using *Get* and *Peek* (197). Try the program in Figure 1.

This program demonstrates both *Peek* and *Get*. Line 10 checks if a key has been pressed — if not, it continues to check, otherwise it reads the *Peek* value of the key (line 30). The information is then printed. Try various keys.

VICTRICK No.2: Normally only the cursor keys and SPACE repeat on the Vic. By Poking 650,255 all the keys can be made to repeat. Any number less than 83 restores the keys to their normal states.

So the two programs in Figure 2 are equivalent:

You may see that *Peek* (197) has the edge for speed of response and execution, so for the moment we'll stick with that. Coupled with last week's ideas, we can now start to write our program (Figure 3).

The only new things in the program are lines 70 and 80, which simply set limits on the screen position of your ship. Line 120 stops the "blob" going off the screen.

This is still no good until we can fire missiles. The problem here is how to allow your ship, the "blob", and the missile all to

move at the same time. Add the following lines:

```
65 IF C = 30 THEN G = B - 22
133 IF G > 0 THEN POKE G,66:POKE G + 30720,5
135 IF G < 7680 THEN G = 0:GOTO 30
137 POKE G,32:POKE G + 30720,1:G = G - 22
```

Line 65 sets the starting position of the missile above your base if the "I" key has been pressed. Lines 133 to 137 check to see if a missile should be in flight and, if so, move and colour it. To colour the base, type:

```
■ FOR A = 3884 TO 38905:POKE A,4:NEXT
```

All we have done is colour the bottom line of the screen!

As yet, our missile does not do anything if it hits the "blob". The way to overcome this is to *Peek* the space in front of it each time it is moved (remember the screen is memory-mapped, that is, each "square" on the grid is a memory location and can have objects — or rather, their screen codes — Poked into it, or Peeked from it). So put:

```
138 IF PEEK (G - 22) = 81 THEN POKE 36878,
280:POKE G,32:POKE G - 22,42:POKE 36875,
8:G = 0
```

Don't forget to add *Poke* 36878, 15 to line 10! So now the computer acknowledges a hit (though that's about all). Let's improve the graphics a bit. How about:

```
105 IF F = 2 OR F = 4 THEN H = 73: = 85:GOTO
110
107 H = 75:1 = 74
110 POKE A,32:POKE A + 1,32:POKE A - 1,32:A =
A + D(F)
130 POKE A,81:POKE A + 1, H:POKE A - 1,1
```

A little better perhaps? Lines 105 and 107 decide whether the wings of the bird will be up or down, depending on the random number, F.

VICTRICK No.3: The screen can be regarded as a "window" which can be moved around. The memory locations containing the position of the window are 36865 (38) and 36864 (12). The figures in brackets indicate the normal values here. Try Poking various numbers into them. As well as this, the width and height of the window are determined by the values in 36866 (150) and 36867 (174). Experiment! You may come up with some interesting effects.

So, there's a start to a game. Most arcade games on the Vic will use these concepts (ie: use of keyboard *Peeks* for inputs, screen *Peeks* to check movements on the screen, etc). I'll leave it to you to devise a method of scoring (preferably with more points the higher the bird is); sound effects for the missiles; and a more impressive routine for when there is a hit (a word of advice: change line 136 to: 136 IF *Peek* (G - 22) = 81 Then X = 0:Gosub 500 and start a subroutine here, then you've got yards of space to work in — don't forget to make *Return* your last line). What we're looking for are good sound effects and graphics display.

I hope I've suitably shown you the "bare bones" of this type of game. Do try and improve on the ideas here; necessarily they are a little brief. Next week, although the Vic graphics are fairly good, I'll be showing you how to vastly improve them. See you then!

Figure 1

```
10 PRINT "[CLR SCN] HIT A KEY!"
20 GETAS:IF AS = "" THEN GOTO 20
30 A = PEEK (197)
40 PRINT "[CLR] THE PEEK (197)
VALUE OF" AS "=" A
50 GOTO 20
```

Figure 2

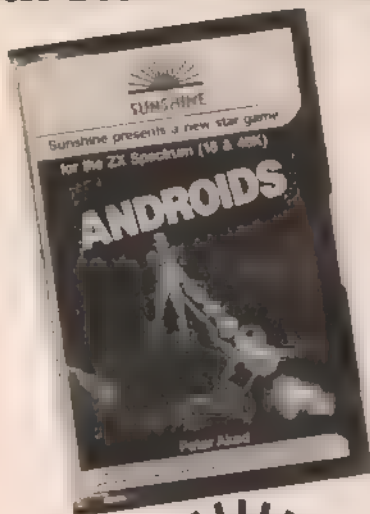
```
10 B = 7933
20 A = PEEK (197):IF A = 64 THEN 20
30 POKE B,32
40 IF A = 33 THEN B = B - 1
50 IF A = 26 THEN B = B + 1
60 POKE B,160:GOTO 20

10 B = 7933:POKE 650,255
20 GETAS:IF AS = "" THEN 20
30 POKE B,32
40 IF AS = "Z" THEN B = B - 1
50 IF AS = "X" THEN B = B + 1
60 POKE B,160:GOTO 20
```

Figure 3

```
10 POKE 36879,8:PRINT "[CLR SCN]":
D(1) = 22:D(2) = -22:D(3) = 1:D(4) =
-1
20 A = 7933:B = 8174
30 C = PEEK (197):IF C = 64 THEN 100
40 POKE B,32
50 IF C = 33 THEN B = B - 1
60 IF C = 26 THEN B = B + 1
70 IF B < 8164 THEN B = 8164
80 IF B > 8185 THEN B = 8185
90 POKE B,160
100 F = INT (RND(1)*4) + 1
110 POKE A,32:A = A + D(F)
120 IF A < 7680 OR A > 8163 THEN A = A
- D(F)
130 POKE A,81
140 GOTO 30
```

Androids – the latest Spectrum game from Sunshine



Androids (Any ZX Spectrum)

Trapped in an endless maze populated only by vicious androids your only objective — survival. You have a lazer of course and can withstand a few blows, but you'd better be quick on the draw, these guys are designed to kill. Maybe you can find an exit — but escape is impossible and your replenished resources won't last long. The fastest, most head-spinningly demanding game you'll ever play. **£5.95**

Please send me _____ copies of **Androids** at £5.95 each
I enclose a cheque/postal order for £_____ payable to
Sunshine, 12-13 Little Newport Street, London WC2R 3LD

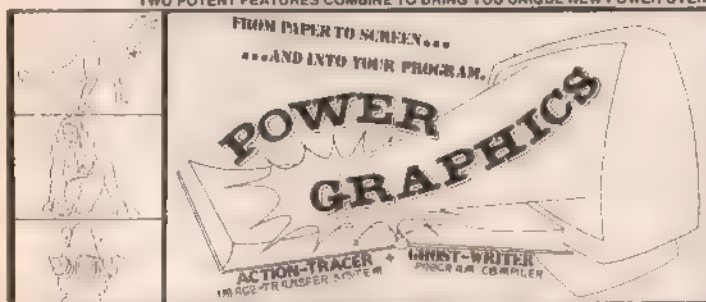
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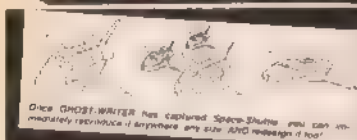
NOW YOU CAN LIFT STATIC DRAWINGS, PHOTOGRAPHS, ETC RIGHT OFF THE PAPER AND BRING THEM TO LIFE INTO YOUR PROGRAM!
TWO POTENT FEATURES COMBINE TO BRING YOU UNIQUE NEW POWER OVER YOUR SPECTRUM GRAPHICS!



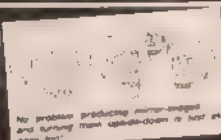
● ACTION-TRACER Gives you the power to transfer drawings, photographs, paintings, lettering - in fact ANY paper-based image into full colour line drawings on your Spectrum screen, with astonishing ease and an accuracy that rivals expensive digitalisers. But this time you get more than just a static on-screen design that has to be laboriously redrawn on and off tape. **INTERACTIVE!**

● GHOST-WRITER interprets your on-screen sequence of basic instructions needed to EXACTLY reproduce it, and then writes the program for you, directly into memory! New program lines appear in your listing which are interchangeable from ones you might have written yourself. When you're finished, **POWERGRAPHICS** will self-destruct, leaving behind only your new program. **That's ready to use.**

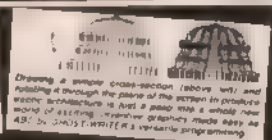
TOGETHER THEY'RE DYNAMIC!
The new program captures your design DYNAMICALLY, giving you instantly the power to MOVE it anywhere, to ROTATE it down to a single pixel, or EXPAND it to fill the screen. You can SQUEEZE or STRETCH it into weird distortions. Flip it UPSIDE DOWN or MIRROR-IMAGE it, ROTATE it in the plane of the screen. In other words, MANIPULATE IT UNDER YOUR FULL CONTROL!



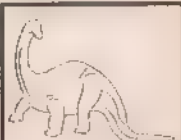
Once **GHOST-WRITER** has captured Space-Shuttle, you can immediately reproduce it anywhere, any size, AND redesign it too!



No problem producing mirror-images and turning them upside-down is just as easy, too!



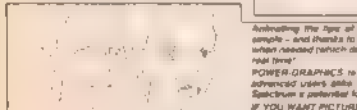
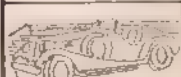
Drawing a simple cross-section (above left) and rotating it through the plane of the screen to produce a mirror image is just a piece of cake with **POWERGRAPHICS**. Drawing a simple cross-section (above left) and rotating it through the plane of the screen to produce a mirror image is just a piece of cake with **POWERGRAPHICS**. Drawing a simple cross-section (above left) and rotating it through the plane of the screen to produce a mirror image is just a piece of cake with **POWERGRAPHICS**.



MANIPULATION OR ANIMATION? GHOST-WRITER ALWAYS WRITES EXACTLY THE PROGRAM YOU NEED!
You can tell **GHOST-WRITER** to program selected parts of your design with their own special line numbers, allowing you to call them as separate sub-routines. That you can add or remove parts of sub - like the Buridan burner in the chemistry diagram.

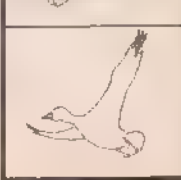


INSTANT FORGIVENESS!
How could you like to write a program that copies your mind exactly as you do yourself?
It's just a few minutes fun with **POWERGRAPHICS**.



Introducing the line of this vast-angled new-world (microphone 'lip') is just as simple - and thanks to **POWERGRAPHICS**, ability to produce high-contrast curves when needed (such as ball as straight) for curved lips can be achieved in real time!
POWERGRAPHICS is fun to use, simple in operation, and for beginners and advanced users alike is an important new programming tool that extends the Spectrum's potential for imaginative graphics into exciting new regions. **IF YOU WANT PICTURES YOU CAN USE, IT HAS TO BE POWERGRAPHICS.**

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MONSTER MINE by W. E. MacGowan. Escape from the mine with as much money as you can, but don't get chased in or caught by the prowling monsters. An addictive machine code game, with superb graphics and save facility. Price (LYNX & DRAGON) £7.95. Price (SPECTRUM & ZX81) £4.95.

GOLF by Pete Allen. An excellent Basic program, giving you an 18-hole course, with handicaps and choices of clubs. A golfing weakness must be specified. Amazing graphics and sound!! Price (LYNX & DRAGON) £7.95.

CHATEAU by Pete Allen. A new type adventure, in which you must wander the Count's old mansion in search of treasure! Of course, when the Count hid his treasure, then died, he left lots of unpleasant surprises for those brave enough to try and seek out his riches! Come face to face with Ghouls and Ghosts, Vampires and Trolls; do you run or fight? Will the mysterious Travel Agent suddenly appear and whisk you away to far off places? Where can you find the key or the lamp? Is the dock body-trapped? Will you die a cold and lonely death, or will you win through to claim the fantastic treasures of The Chateau? Price (DRAGON) £7.95.

GAMES PACK III by Christopher Hunt.

REVERSI. Pit your wits against the Lynx with this easy to learn, yet extremely demanding board game. Five AI levels, from novice to grand master.

SNAKE. Guide the snake to the food, but watch out, he will grow and must not eat the wall or himself.

PONTOON. An excellent implementation of a favourite card game in full colour with sound. Lynx is a mean Berner. Price (LYNX) £7.95.

GEMPACK IV by W. E. MacGowan. Two great machine code games, with full colour graphics. In *Sea Harrier* you must land your plane on the aircraft carrier, after disposing the clouds with chemical bombs, but don't let the ship in *Sea Chase* you must depth charge the wolf pack without being sunk. Both with four levels of play from easy to kamikaze! Price (LYNX & DRAGON) £7.95.

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"a remarkably good version.... well worth the money."
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This program, for ■ 16K Spectrum, allows you to construct a line of music which is then written on the screen and played at the same time. This line of music can then be saved for future use. The music is saved in three parts, so remem-

When you enter the notes, be careful to enter them correctly (from A to G!), otherwise some peculiar effects will be seen. A correction routine is not used as

The main parts of the program are as follows:

- 10 -- Screen Colours
- 14-15 -- Variables
- 100-160 -- Print notes subrouline
- 200-290 -- Main note calculations
- 1000-1200 -- Print stave
- 2000-2200 -- Write music
- 3000-3054 -- Learn music
- 4000-4026 -- Games routines
- 6000-9100 -- Menu
- 9900-9991 -- Data for note graphics

```

10 POK 23055.0 BORDER 1: PA
13 INK 0: CLS GO SUB 9990
14 REM
15 LET 90=0: LET pr=9: LET 9=0
16 DIM a(12): DIM bs(2): DIM
17 DIM c(130): DIM (11)
18 LET a(1)=1: LET a(2)=1
19 LET b(1)=1: LET b(2)=1
20 GO TO 6000
21 REM
22 PRINT OVER 1:AT pr,9;"0": R
23 PRINT OVER 1:AT pr,9;"0": A
24 REM
25 PRINT OVER 1:AT pr,9,a(1),
26 pr+1,bs(2): RETURN
27 PRINT OVER 1:AT pr,9,b(1),
28 pr+1,bs(2): RETURN
29 PLOT (pr+1,bs(2))-(pr+1,
30 bs(2)): DRAW 0,16:
31 PLOT (pr+1,bs(2))-(pr+1,
32 bs(2)): DRAW -16:
33 REM
34 LET 99=1
35 LET no=CODE a(1)-67: LET 8
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[illegible]


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3020 GO TO 3000
3021 REM *****
3022 RESTORE : LET r=0 : LET n=
3023 LET s=0 : LET g=0 : GO SUB 1
3024
3025 GO SUB 3005 : GO TO 3035
3026 READ n: LET n=n+1
3027 IF n=13 THEN RETURN
3028 PRINT AT 11.9+2.5
3029 LET v=v+1
3030 GO SUB 200
3031 IF r=1 THEN RETURN
3032 GO TO 3005
3033 PRINT AT 1.1: "This is the
3034 scale of C Major. The first note
3035 is C and the last is C1. 8 notes
3036 after the first."
3037 PRINT AT 13.5: "A 'scale' is
3038 a group of notes which are arrang
3039 ed in a special order so to mak
3040 e, in simple terms, a major or min
3041 or sequence."
3042 GO SUB 3000
3043 CLS : PRINT AT 0.2: "The leng
3044 th of note depends on the leng
3045 th one gives it."
3046 PRINT AT 3.3: "ie. : "AT 4.0
3047 "Semi-breve"= 1 sec. DEEP len
3048 "Minia" = 0.5 sec. DEEP
3049 length" PLOT 0.124 DRAW 0.12
3050 PRINT AT 0.0: "Crochet" = 0.
3051 5 sec. DEEP length" PLOT 0.10
3052 DRAW 0.12 PRINT AT 10.0: "Qua
3053 ver" = 0.125 sec. DEEP length"
3054 PLOT 0.92 DRAW 0.12 DRAW 0.10
3055 PRINT AT 14.2: "When you try
3056 and write your own music thes
3057 e will be abbreviated to
3058 'M', 'C' and 'Q' respectively."
3059 GO SUB 3000
3060 CLS : PRINT AT 0.2: "This rou
3061 tine shows the difference
3062 between different lengths o
3063 f notes."
3064 RESTORE : GO SUB 1000 : LET
3065 1=0
3066 LET n=.025 : GO SUB 3005 : PF
3067 INT AT 14.0: "Quavers"
3068 GO SUB 3000
3069 GO SUB 3000
3070 LET n=.25
3071 PRINT AT 14.0: "Crotchets" : GO SUB 30
3072
3073 GO SUB 3000
3074 LET n=.5 : GO SUB
3075
3076 PRINT AT 14.0: "Minia" : GO
3077 SUB 3000
3078 GO SUB 3000

```

```

3052 LET g=5 : LET n=1 : GO SUB 3
3053 PRINT AT 14.0: "Semi-breves"
3054 GO SUB 3000
3055 CLS
3056 GO TO 3000
3057 STOP

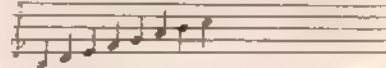
```

MUSIC

- 1 LEARN MUSIC
- 2 WRITE MUSIC
- 3 MUSIC FOR GAMES
- 4 SAVE MUSIC
- 5 LOAD MUSIC
- 6 QUIT PROGRAM

INPUT NO. (1-6)

This is the scale of C Major. The first note is C and the last is C1. 8 notes after the first.



C D E F G A B C1

A "scale" is a group of notes which are arranged in a special order so to make, in simple terms, a major or minor sequence.

Press any key to continue. The length of note depends on the length one gives it.

Semi-breve = 1 sec. DEEP length

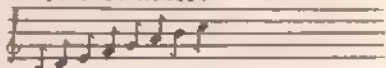
Minia = 0.5 sec. DEEP length

Crochet = 0.25 sec. DEEP length

Quaver = 0.125 sec. DEEP length

When you try and write your own music these will be abbreviated to 'S', 'M', 'C' and 'Q' respectively.

Press any key to continue. This routine shows the difference between different lengths of notes.



C D E F G A B C1 Quavers

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A fundamental constant

Boris Allan presents a program to calculate the value of e

The exponential, e , the base of natural logarithms, is a fundamental constant in mathematics. e appears in many guises, especially in calculus, and has a very simple definition:

$$e = 1 + 1/1! + 1/2! + 1/3! + 1/4! + 1/5! + \dots$$

and onwards. In English, this means that e is the sum of 1 plus the reciprocal of the factorial of 1, plus the reciprocal of the factorial of 2, plus the reciprocal of the factorial of 3, and so forth. The factorial of, say, 4 is $4 \times 3 \times 2 \times 1$ and so it is simple to realise that $4! = 4 \times 3 \times 2 \times 1$.

Rewriting the expansion for e , we can produce:

$$e = 1 + 1/1! + 1/2! + 1/3! + 1/4! + 1/5! + \dots$$

where, in general, $1/n! = 1/(n-1)! \times n$ — think about it. To produce a value for e by simple Basic program is not too difficult:

```
1000 M=0:T=1:E=0
1010 REPEAT
1020 M=M+1:T=T*M:E=E+1/T
1030 UNTIL T=0
```

and this will produce a value correct to about 7 decimal places — hardly an

earth-shattering calculation, but then hardly earth-shattering accuracy either. I want to rule the digits.

Suppose I asked you to calculate the value of e correct to a small number of decimal places, say 20? Suppose that I was cruel (am cruel) and you had to work it out by hand (assume that you can still remember how to add, subtract, divide and multiply)? First, you would calculate term 1, $1/1!$, to 20 decimal places — actually the answer is 1. Second, you would take the result of $1/1!$, and divide that by 2, to obtain $1/2!$ — answer .5. $1/3!$ is .5 divided by 3, and does not finish exactly — .1 followed by an infinite number of 6s.

There are various ways in which it is possible to cope with these never-ending 6s, including: forget about it, just have a 1 and then nineteen 6s; round the last 6 up to give a 7; or perform the calculation to a greater number of digits, and forget about rounding until the very end (the end comes when all the digits of the term are zero). I propose to use the third variant, because it

is simpler and is more accurate than rounding at the end of each term's 20 digits.

So, we have worked out how to perform the operation: take each succeeding term, divide it by the correct factor, and then add the result to the cumulating total. All we have to do is to work out how to divide long numbers (lots of little divisions), and then how to add all the terms together (and round the result).

The most important part of the program is that between lines 10 and 100, and in line 110, the formatter (@%) is set to produce 1 digit wide output (for the output at lines 300 to 330). At 120 the number of digits (N%) is input, and 4 added to that number — the extra digits accuracy. Term%(N%) is the array I use to store the N% digits of the successive terms, and E%(N%) is the array used to store the cumulated total (remember N% is now 4 more than the number of digits needed in the result).

Line 140 initialises the zero elements of Term% and E% to 1: the zero element is the whole number, and elements 1 to N% are the N% decimal places; the initial value of e (before any term) is 1, and the first term is also 1. M% (the term number)

```
10REM-----
20
40REM CALCULATION OF THE CONSTANT e
50
60
70REM (c) BORIS ALLAN, 1983
80
100REM-----
110 @%=1: REM SETS FORMAT
120 INPUT N%: N%=N%+4
130 DIM TERM%(N%),E%(N%)
140 TERM%(0)=1:E%(0)=1
150 M%=1
160
170 REPEAT SUM%=0: REM BUILDS UP TERMS
180 FOR I%=0 TO N%
190 IF TERM%(I%)<>0 THEN PROC_DIVISION
200 NEXT I%
210 M%=M%+1
220 UNTIL SUM%=0: REM ALL TERMS ARE ZERO
230
240 FOR I%=N% TO 1 STEP -1: REM ISOLATES ENTRIES
250 IF I%=N%+4 THEN E%(I%)=E%(I%)+E%(I%+1)/5: REM ROUNDING
260 FOR J%=I% TO 1 STEP -1
270 IF I%=J% THEN PROC_SPLITTING
280 NEXT J%: NEXT I%
290
300 N%=N%-4: REM READY TO PRINT OUT RESULT
305 VDU 2
310 PRINT E%(0):" "
320 FOR I%=1 TO N%: PRINT E%(I%): NEXT I%: PRINT
325 VDU 3
330 END: REM OF MAIN PROGRAM
340
350 DEF PROC_DIVISION: REM DIVIDING BY M%
360 IT%=TERM%(I%)/M%
370 IF I%<N% THEN PROC_TERMS
380 ENDPROC: REM _DIVISION
390
400 DEF PROC_TERMS: REM ADDING TERMS
410 TERM%(I%+1)=TERM%(I%+1)+10*(TERM%(I%)-M%*IT%)
420 TERM%(I%)=IT%
430 E%(I%)=E%(I%)+IT%
440 SUM%=SUM%+IT%
450 ENDPROC: REM _TERMS
460
470 DEF PROC_SPLITTING: REM DISTRIBUTING TERMS
480 SUM%=1: FOR K%=1 TO J%: SUM%=SUM%+10: NEXT K%
490 IT%=E%(I%)/SUM%
500 E%(I%-J%)=E%(I%-J%)+IT%
510 E%(I%)=E%(I%)-SUM%*IT%
520 ENDPROC: REM _SPLITTING
```


starts at 1 — line 150.

From 170 to 220 a short routine is repeated until \square variable $\text{Sum}\%$ is zero: the first thing to happen is that $\text{Sum}\%$ is set to zero. For each element/digit from 0 to $N\%$ (line 180) a check is made to see if that element of the $\text{Term}\%$ array is zero, if not Proc_division is called.

The routine at 350 to 380 is made into a Proc , and not incorporated into the main program, because it clarifies the condition — statement at line 190 (and obviates the need for a Goto). At line 360, the existing value stored in the 1% th element of $\text{Term}\%$ is integer divided by $M\%$ (the number of the term in the sequence). If the element is not the last in the array (ie $1\% < N\%$) then a call is made to Proc_terms (again to save a Goto).

When one divides a number, the re-

mainder of the division is carried on to the next digit in the sequence: this is what occurs in lines 410 to 420. Line 430 is where the array $E\%$ is cumulated. \square line 440 $\text{Sum}\%$ is incremented and, if no arithmetic is performed (ie, all zeros), $\text{Sum}\%$ ends up as zero. After these calls, control returns to line 200 where $M\%$ is incremented by 1. This continues until $\text{Sum}\% = 0$, stasis.

The next segment (240 to 280) examines successive elements of $E\%$, from the least significant leftwards. Lines 280 \square 280 operate on three elements at a time, based on the element 1% by use of Proc_splitting .

In line 480, $\text{Sum}\%$ takes the value 10, 100, or 1000, depending on the value of $J\%$ — this routine splits each value \square an element steadily into digits (tens, hundreds

and thousands), to take into account the fact that a value stored in $E\%(1\%)$ will probably be greater than 9. The number of elements is greater (by 4) than the number of digits accuracy, and at line 250 the value stored in element $N\% - 4$ is rounded.

The section from 300 to 330 prints out the value to the specified number of digits; lines 305 and 325 switch the printer on and off — you know what to do \square you have no printer.

Here is a problem: Improve this routine, and implement it for positive and negative values of X , where the exponent of X is:

$\exp(X) = 1 + X/1 + X^2/2! + X^3/3! + \dots$

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59457138217850516643742746639193000305992181741359662904357290033429526059563073
8132328627943490763238298807531952510140115738341879307021540891499348841675092
44761460668082264800168477411853742345442437107539077744992069551702761838606261
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16928368190255151086574637721112523897844250569526967707854499699679468644549059
87931636889230098793127736178215424999229576351482208269895193668033182528869398
4464651058209392398294887933203650944711730123819706841614039701983767932068328
2376464804295311802528782509819455815101756173613320698112509961818815930416903
51590888519345807273866738589422879228499892086605825749279610484198444367463244
96848756023362482704197867109900216099023530436994184914631409343173814364054625
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041718986106873969655212671546889570350354

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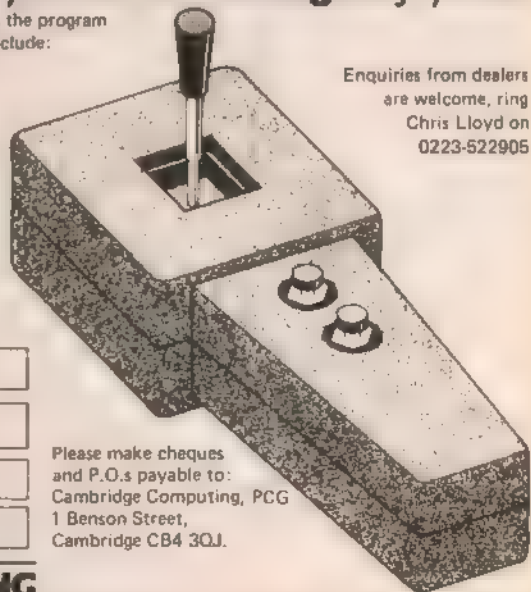
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Noughts and crosses

C Moorhouse explains how to print on the graphics screen and play noughts and crosses

The only drawback to the Dragon 32 is its inability to print on the graphics screens. The elegant solution is described by David Lawrence in his book *The Working Dragon 32* (a must for every Dragon 32 owner).

However, for only a few characters, it is still easier to Draw them. Where one or two letters are to be used a number of times, the *Get*/*Put* commands mean that *Draw* has to be used only once per character. An advantage of *Put* is that it can draw over

information already there. This enables grids to be identified by numbers inside each square.

An example of the saving in program space is shown in the accompanying program — *Noughts and Crosses*.

Program notes

Lines	
20-90	GET characters X and O into memory
110-340	Set up the playing board
350-560	Main loop
600-620	Set up another game
630-640	Finish game
1000-1080	Instructions

```

1 REM NOUGHTS AND CROSSES
2 REM LAST REVISED: 13/12/82
3 REM
4 REM WRITTEN FOR DRAGON 32
5 REM BY CHRIS MOORHOUSE
6 REM
7 GOSUB 1000
9 DIM X(30,30):DIM O(30,30)
10 PMODE 2,1:SCREEN 1,1:PCLS
20 X$="NE15NF15NG15NH15"
30 O$="R3OD3OL3OU3O"
50 DRAW"C5BM75,30;X$;"
60 DRAW"C5BM110,15;O$;"
70 GET(60,15)-(90,45),X,G
80 GET(110,15)-(140,45),O,G
90 PCLS
110 LINE(100,5)-(100,155),PSET
120 LINE(150,5)-(150,155),PSET
130 LINE(50,55)-(200,55),PSET
140 LINE(50,105)-(200,105),PSET
150 DRAW"C5BM75,27D6"
160 DRAW"C5BM123,27R5D3L5D3R5"
170 DRAW"C5BM173,27R5D3NL5D3L5"
180 DRAW"C5BM73,77D3R5NU3D3"
190 DRAW"C5BM127,77L5D3R5D3L5"
200 DRAW"C5BM177,77L5D6R5U3L5"
210 DRAW"C5BM73,127R5D6"
220 DRAW"C5BM123,127R5D3NL5D3L5U6"
230 DRAW"C5BM173,132R5U6L5D3R5"
240 DRAW"C5BM29,180U10F10U10"
250 DRAW"C5BM53,170L10D5NR10D5R10"
260 DRAW"C5BM61,175NF5NE5NG5NH5"
270 DRAW"C5BM68,170R5ND10R5"
280 DRAW"C5BM90,170R10D5L10NU5D5"
290 DRAW"C5BM104,170D10R10"
300 DRAW"C5BM118,180U10R10D5NL10D5"
310 DRAW"C5BM132,170F5NE5D5"
320 DRAW"C5BM156,170L10D5NR10D5R10"
330 DRAW"C5BM160,180U10R10D5LNL2F6"
340 DRAW"C5BM175,175R10"
350 PUT(200,158)-(230,188),X,PSET
360 GOTO 400
370 PUT(200,158)-(230,188),O,PSET
380 GOTO 400
400 P=PPOINT(215,173)
410 A$=INKEY$:IF A$="" THEN 410
420 A=VAL(A$)
430 ON A GOTO 450,460,470,480,
    490,500,510,520,530
440 IF A=0 THEN GOTO 600
450 H=60:V=15:GOTO 540
460 H=110:V=15:GOTO 540
470 H=160:V=15:GOTO 540
480 H=60:V=65:GOTO 540
490 H=110:V=65:GOTO 540
500 H=160:V=65:GOTO 540
510 H=60:V=115:GOTO 540
520 H=110:V=115:GOTO 540
530 H=160:V=115:GOTO 540
540 Q=PPOINT(H,V)
545 IF Q=5 THEN GOTO 410
550 IF P=0 THEN PUT(H,V)-(H+30,V+30),
    O,PSET:GOTO 350
560 IF P=5 THEN PUT(H,V)-(H+30,V+30),
    X,PSET:GOTO 370
600 CLS:PRINT@262,"ANOTHER GO(Y/N)?"
610 B$=INKEY$:IF B$="" THEN 610
620 IF B$="Y" THEN GOTO 10
630 PRINT@260,"THANK YOU FOR PLAYING"
640 PRINT@331,"GOOD-DAY":END
1000 CLS8:PRINT@261,"WELCOME TO THE
    GAME OF";
1010 PRINT@326,"NOUGHTS AND CROSSES";
1020 FOR N=1 TO 2000: NEXT N:CLS3
1030 PRINT@65,"PLAYER 1 USES THE
    CROSSES (X)";
1040 PRINT@104,"AND HAS FIRST GO";
1050 PRINT@166,"PLAY THEN ALTERNATES";
1060 PRINT@264,"AFTER EACH GAME";
1070 PRINT@295,"PRESS ANY LETTER";
1080 FOR N=1 TO 5000: NEXT N: RETURN
    
```


Modules 10-14

Continuing our series on machine code master

Modifying the memory

Having learned how to examine the memory we now proceed to the next stage, which is altering its contents. In this section we present two more modules which will allow you to step through the memory, forwards or backwards, displaying the contents of individual bytes and, if you wish, altering the contents of the byte currently displayed.

Module 1.10

On the basis of previous modules, you should have little difficulty in discerning that this module accepts a hex value in the range 0-FF (0-255), calls up a translation into decimal and returns that value to the next module, from which it is called.

Module 1.11

The purpose of this module is to allow the user to step through the memory from a chosen start address and to modify the contents of individual bytes. The major part of the module is concerned with outputting the values in each byte to the screen in a comprehensible format and to moving through the memory. Changes to memory contents are accomplished by the

last line, including a call to the previous module.

Commentary

Having obtained the start address, the address of the current byte is printed out, together with the value which it contains.

Four prompts are used by the module: + means move on to the next byte, - means move back one byte and E quits the module. The remaining prompt is I, which calls up the previous module and allows a new value to be placed into the current byte.

Module 1.12

Should you wish to use the monitor to enter machine code programs directly into the memory in hexadecimal form, this one line routine will allow you to call up the machine code routine without having to quit the program. It would be wise not to run any machine code program before ensuring that the program so far entered has been saved.

Saving and loading files

Now that you have the ability to enter new values into the memory and hence to

develop a machine code program, you need to be able to save the programs that you will eventually develop and enter. You also need to be able to reclaim those programs from disc or tape, depending on where you wish to store them. The four short routines which follow are designed to make this possible.

Module 1.13

When saving a block of information on tape or disc — this is done in the form of a file — a named location must first be opened before information is sent to it and then closed when all the necessary information has been stored. When the information is recalled, the name of the file needs to be specified. This module allows the necessary file name to be input.

Module 1.14

The machine code programs which you will eventually develop with the aid of the programs in this book will be contained in blocks of memory. To save them, the program must be given two pieces of information, namely where the block starts and where it finishes. We already have a routine which obtains the start address, this one performs the same function for the finish address.

This is an extract from *Commodore 64 Machine Code Master* by David Lawrence and Mark England, published by Sunshine Books.

MODULE 1.10

```
13000 REM*****
13001 REM GET 1 BYTE
13002 REM*****
13007 H$ = ""
13010 INPUT "BYTE ( IN HEX ) : "; H$
13030 GOSUB 11950
13040 IF ERR OR H<0 OR H>255 THEN PRINT
"ICU1" : GOTO 13000
13050 RETURN
```

MODULE 1.11

```
13100 REM*****
13101 REM MEMORY MODIFY
13102 REM*****
13110 GOSUB 12050
13120 H = AD : GOSUB 11000 : PRINT H$ TA
B(6) "/" : G2$ = ""
13140 GOSUB 11100 : AD = AD-1 : PRINT H$
SPC(6) :
13150 T$ = ""
13160 INPUT " +, -, I, E : "; T$
13170 IF T$="+" AND AD<65535 THEN AD = A
D+1 : GOTO 13120
13180 IF T$="-" AND AD>0 THEN AD = AD-1
: GOTO 13120
13190 IF T$="E" THEN RETURN
13200 IF T$<>"I" THEN PRINT"[2*CU]" : GO
TO 13120
13210 GOSUB 13000 : POKE AD,H : GOTO 131
20
```

MODULE 1.12

```
13500 REM*****
13501 REM MACHINE CODE EXECUTE
13502 REM*****
13510 GOSUB 12050 : SYS AD : RETURN
```

MODULE 1.13

```
11250 REM*****
11251 REM INPUT FILE NAME
11252 GOSUB 25500 : IF DEV=4 THEN 11290
11255 IN$ = ""
11260 INPUT " FILE NAME : "; IN$ : T = L
EN(IN$)
11280 IF T>16 OR T<0 THEN PRINT "[C]FIL
E NAME INVALID" : GOTO 11260
11290 RETURN
```

MODULE 1.14

```
11200 REM*****
11201 REM INPUT FINISH ADDRESS
11202 REM*****
11205 H$ = ""
11210 INPUT "FINISH ADDRESS ( IN HEX ) :
"; H$ : GOSUB 11950
11230 IF ERR OR H<0 OR H>65535 THEN 1120
0
11240 EA = H : RETURN
```

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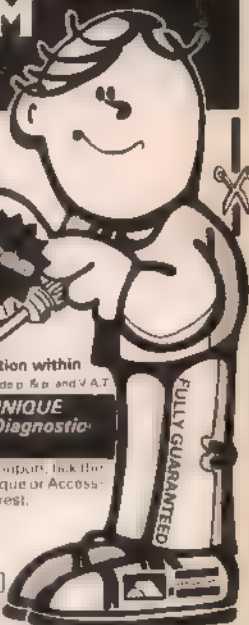
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Racer

on Vic20

This program makes use of hi-res graphics, colour and sound (not forgetting on-screen scoring of course).

The object of the game is to score as many laps as possible; to score a lap you

must drive through the gate which will appear after a short while at the top of the screen.

To make the game more difficult a barrel goes around the screen removing the gate and if you hit it you crash. When you have passed through the gateway, the gate shuts for a while and a lap is added to your score.

Keys

S up X down
< left > right

Program notes

10-20 Sets graphics and sound
30-60 Data car graphics
61 Protects graphics
100-180 Prints race course
190 Sets main variables
200 Prints your car in its present position
205-208 Prints barrel in its present position
209 Switches sound on
210-240 Checks if key has been pressed
242 Sound off
245 Prints gate
250-290 Checks if your car has crashed
300-340 Checks if the barrel has hit the side of the race course and sets new barrel direction
350-355 Car passed through gate and lap score
1000 Another go plus hi-score

```
10 POKE36869,255:FORI=7168TO7679:POKEI,
PEEK(25600+I):NEXTPRINT"3",
20 FORR=7168TO7167+80:READD POKER, NEXT
POKE36878,15
30 DATA195,219,126,207,207,126,219,195,195,
219,126,243,243,126,219,195
40 DATA 3,255,60,126,102,36,255,219,219
255,36,102,126,60,255,219,0,102,102,0,
0,102,102
50 DATA0,0,102,100,0,0,96,64,0,0,102,98,0
0,6,2,0,0,64,96,0,0,100,102,0,0,2,6,0
0,38,102
60 DATA0,60,66,135,140,141,105,60,60,255,
255,255,255,255,255,255,255
70 POKE32,255
100 GOTO1000
110 PRINT"#####RACER#####
#####
120 PRINT"RACE COURSE WILL BE OPEN IN 5"
130 PRINT"SECONDS"
140 PRINT"COUNTDOWN TO GO"
150 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
160 PRINT"SECONDS"
170 PRINT"COUNTDOWN TO GO"
180 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
190 PRINT"SECONDS"
200 PRINT"COUNTDOWN TO GO"
210 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
220 PRINT"SECONDS"
230 PRINT"COUNTDOWN TO GO"
240 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
250 PRINT"SECONDS"
260 PRINT"COUNTDOWN TO GO"
270 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
280 PRINT"SECONDS"
290 PRINT"COUNTDOWN TO GO"
300 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
310 PRINT"SECONDS"
320 PRINT"COUNTDOWN TO GO"
330 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
340 PRINT"SECONDS"
350 PRINT"COUNTDOWN TO GO"
360 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
370 PRINT"SECONDS"
380 PRINT"COUNTDOWN TO GO"
390 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
400 PRINT"SECONDS"
410 PRINT"COUNTDOWN TO GO"
420 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
430 PRINT"SECONDS"
440 PRINT"COUNTDOWN TO GO"
450 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
460 PRINT"SECONDS"
470 PRINT"COUNTDOWN TO GO"
480 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
490 PRINT"SECONDS"
500 PRINT"COUNTDOWN TO GO"
510 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
520 PRINT"SECONDS"
530 PRINT"COUNTDOWN TO GO"
540 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
550 PRINT"SECONDS"
560 PRINT"COUNTDOWN TO GO"
570 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
580 PRINT"SECONDS"
590 PRINT"COUNTDOWN TO GO"
600 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
610 PRINT"SECONDS"
620 PRINT"COUNTDOWN TO GO"
630 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
640 PRINT"SECONDS"
650 PRINT"COUNTDOWN TO GO"
660 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
670 PRINT"SECONDS"
680 PRINT"COUNTDOWN TO GO"
690 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
700 PRINT"SECONDS"
710 PRINT"COUNTDOWN TO GO"
720 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
730 PRINT"SECONDS"
740 PRINT"COUNTDOWN TO GO"
750 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
760 PRINT"SECONDS"
770 PRINT"COUNTDOWN TO GO"
780 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
790 PRINT"SECONDS"
800 PRINT"COUNTDOWN TO GO"
810 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
820 PRINT"SECONDS"
830 PRINT"COUNTDOWN TO GO"
840 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
850 PRINT"SECONDS"
860 PRINT"COUNTDOWN TO GO"
870 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
880 PRINT"SECONDS"
890 PRINT"COUNTDOWN TO GO"
900 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
910 PRINT"SECONDS"
920 PRINT"COUNTDOWN TO GO"
930 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
940 PRINT"SECONDS"
950 PRINT"COUNTDOWN TO GO"
960 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
970 PRINT"SECONDS"
980 PRINT"COUNTDOWN TO GO"
990 PRINT"#####RACE COURSE WILL BE OPEN IN 5"
1000 GOTO1000
```

```
100 IF=0:THENH=0:IF=1:THENH=1:IF=2:THENH=2
110 IF=3:THENH=3:IF=4:THENH=4:IF=5:THENH=5
120 IF=6:THENH=6:IF=7:THENH=7:IF=8:THENH=8
130 IF=9:THENH=9:IF=10:THENH=10:IF=11:THENH=11
140 IF=12:THENH=12:IF=13:THENH=13:IF=14:THENH=14
150 IF=15:THENH=15:IF=16:THENH=16:IF=17:THENH=17
160 IF=18:THENH=18:IF=19:THENH=19:IF=20:THENH=20
170 IF=21:THENH=21:IF=22:THENH=22:IF=23:THENH=23
180 IF=24:THENH=24:IF=25:THENH=25:IF=26:THENH=26
190 IF=27:THENH=27:IF=28:THENH=28:IF=29:THENH=29
200 IF=30:THENH=30:IF=31:THENH=31:IF=32:THENH=32
210 IF=33:THENH=33:IF=34:THENH=34:IF=35:THENH=35
220 IF=36:THENH=36:IF=37:THENH=37:IF=38:THENH=38
230 IF=39:THENH=39:IF=40:THENH=40:IF=41:THENH=41
240 IF=42:THENH=42:IF=43:THENH=43:IF=44:THENH=44
250 IF=45:THENH=45:IF=46:THENH=46:IF=47:THENH=47
260 IF=48:THENH=48:IF=49:THENH=49:IF=50:THENH=50
270 IF=51:THENH=51:IF=52:THENH=52:IF=53:THENH=53
280 IF=54:THENH=54:IF=55:THENH=55:IF=56:THENH=56
290 IF=57:THENH=57:IF=58:THENH=58:IF=59:THENH=59
300 IF=60:THENH=60:IF=61:THENH=61:IF=62:THENH=62
310 IF=63:THENH=63:IF=64:THENH=64:IF=65:THENH=65
320 IF=66:THENH=66:IF=67:THENH=67:IF=68:THENH=68
330 IF=69:THENH=69:IF=70:THENH=70:IF=71:THENH=71
340 IF=72:THENH=72:IF=73:THENH=73:IF=74:THENH=74
350 IF=75:THENH=75:IF=76:THENH=76:IF=77:THENH=77
360 IF=78:THENH=78:IF=79:THENH=79:IF=80:THENH=80
370 IF=81:THENH=81:IF=82:THENH=82:IF=83:THENH=83
380 IF=84:THENH=84:IF=85:THENH=85:IF=86:THENH=86
390 IF=87:THENH=87:IF=88:THENH=88:IF=89:THENH=89
400 IF=90:THENH=90:IF=91:THENH=91:IF=92:THENH=92
410 IF=93:THENH=93:IF=94:THENH=94:IF=95:THENH=95
420 IF=96:THENH=96:IF=97:THENH=97:IF=98:THENH=98
430 IF=99:THENH=99:IF=100:THENH=100:IF=101:THENH=101
440 IF=102:THENH=102:IF=103:THENH=103:IF=104:THENH=104
450 IF=105:THENH=105:IF=106:THENH=106:IF=107:THENH=107
460 IF=108:THENH=108:IF=109:THENH=109:IF=110:THENH=110
470 IF=111:THENH=111:IF=112:THENH=112:IF=113:THENH=113
480 IF=114:THENH=114:IF=115:THENH=115:IF=116:THENH=116
490 IF=117:THENH=117:IF=118:THENH=118:IF=119:THENH=119
500 IF=120:THENH=120:IF=121:THENH=121:IF=122:THENH=122
510 IF=123:THENH=123:IF=124:THENH=124:IF=125:THENH=125
520 IF=126:THENH=126:IF=127:THENH=127:IF=128:THENH=128
530 IF=129:THENH=129:IF=130:THENH=130:IF=131:THENH=131
540 IF=132:THENH=132:IF=133:THENH=133:IF=134:THENH=134
550 IF=135:THENH=135:IF=136:THENH=136:IF=137:THENH=137
560 IF=138:THENH=138:IF=139:THENH=139:IF=140:THENH=140
570 IF=141:THENH=141:IF=142:THENH=142:IF=143:THENH=143
580 IF=144:THENH=144:IF=145:THENH=145:IF=146:THENH=146
590 IF=147:THENH=147:IF=148:THENH=148:IF=149:THENH=149
600 IF=150:THENH=150:IF=151:THENH=151:IF=152:THENH=152
610 IF=153:THENH=153:IF=154:THENH=154:IF=155:THENH=155
620 IF=156:THENH=156:IF=157:THENH=157:IF=158:THENH=158
630 IF=159:THENH=159:IF=160:THENH=160:IF=161:THENH=161
640 IF=162:THENH=162:IF=163:THENH=163:IF=164:THENH=164
650 IF=165:THENH=165:IF=166:THENH=166:IF=167:THENH=167
660 IF=168:THENH=168:IF=169:THENH=169:IF=170:THENH=170
670 IF=171:THENH=171:IF=172:THENH=172:IF=173:THENH=173
680 IF=174:THENH=174:IF=175:THENH=175:IF=176:THENH=176
690 IF=177:THENH=177:IF=178:THENH=178:IF=179:THENH=179
700 IF=180:THENH=180:IF=181:THENH=181:IF=182:THENH=182
710 IF=183:THENH=183:IF=184:THENH=184:IF=185:THENH=185
720 IF=186:THENH=186:IF=187:THENH=187:IF=188:THENH=188
730 IF=189:THENH=189:IF=190:THENH=190:IF=191:THENH=191
740 IF=192:THENH=192:IF=193:THENH=193:IF=194:THENH=194
750 IF=195:THENH=195:IF=196:THENH=196:IF=197:THENH=197
760 IF=198:THENH=198:IF=199:THENH=199:IF=200:THENH=200
770 IF=201:THENH=201:IF=202:THENH=202:IF=203:THENH=203
780 IF=204:THENH=204:IF=205:THENH=205:IF=206:THENH=206
790 IF=207:THENH=207:IF=208:THENH=208:IF=209:THENH=209
800 IF=210:THENH=210:IF=211:THENH=211:IF=212:THENH=212
810 IF=213:THENH=213:IF=214:THENH=214:IF=215:THENH=215
820 IF=216:THENH=216:IF=217:THENH=217:IF=218:THENH=218
830 IF=219:THENH=219:IF=220:THENH=220:IF=221:THENH=221
840 IF=222:THENH=222:IF=223:THENH=223:IF=224:THENH=224
850 IF=225:THENH=225:IF=226:THENH=226:IF=227:THENH=227
860 IF=228:THENH=228:IF=229:THENH=229:IF=230:THENH=230
870 IF=231:THENH=231:IF=232:THENH=232:IF=233:THENH=233
880 IF=234:THENH=234:IF=235:THENH=235:IF=236:THENH=236
890 IF=237:THENH=237:IF=238:THENH=238:IF=239:THENH=239
900 IF=240:THENH=240:IF=241:THENH=241:IF=242:THENH=242
910 IF=243:THENH=243:IF=244:THENH=244:IF=245:THENH=245
920 IF=246:THENH=246:IF=247:THENH=247:IF=248:THENH=248
930 IF=249:THENH=249:IF=250:THENH=250:IF=251:THENH=251
940 IF=252:THENH=252:IF=253:THENH=253:IF=254:THENH=254
950 IF=255:THENH=255:IF=256:THENH=256:IF=257:THENH=257
960 IF=258:THENH=258:IF=259:THENH=259:IF=260:THENH=260
970 IF=261:THENH=261:IF=262:THENH=262:IF=263:THENH=263
980 IF=264:THENH=264:IF=265:THENH=265:IF=266:THENH=266
990 IF=267:THENH=267:IF=268:THENH=268:IF=269:THENH=269
1000 IF=270:THENH=270:IF=271:THENH=271:IF=272:THENH=272
1010 IF=273:THENH=273:IF=274:THENH=274:IF=275:THENH=275
1020 IF=276:THENH=276:IF=277:THENH=277:IF=278:THENH=278
1030 IF=279:THENH=279:IF=280:THENH=280:IF=281:THENH=281
1040 IF=282:THENH=282:IF=283:THENH=283:IF=284:THENH=284
1050 IF=285:THENH=285:IF=286:THENH=286:IF=287:THENH=287
1060 IF=288:THENH=288:IF=289:THENH=289:IF=290:THENH=290
1070 IF=291:THENH=291:IF=292:THENH=292:IF=293:THENH=293
1080 IF=294:THENH=294:IF=295:THENH=295:IF=296:THENH=296
1090 IF=297:THENH=297:IF=298:THENH=298:IF=299:THENH=299
1100 IF=300:THENH=300:IF=301:THENH=301:IF=302:THENH=302
1110 IF=303:THENH=303:IF=304:THENH=304:IF=305:THENH=305
1120 IF=306:THENH=306:IF=307:THENH=307:IF=308:THENH=308
1130 IF=309:THENH=309:IF=310:THENH=310:IF=311:THENH=311
1140 IF=312:THENH=312:IF=313:THENH=313:IF=314:THENH=314
1150 IF=315:THENH=315:IF=316:THENH=316:IF=317:THENH=317
1160 IF=318:THENH=318:IF=319:THENH=319:IF=320:THENH=320
1170 IF=321:THENH=321:IF=322:THENH=322:IF=323:THENH=323
1180 IF=324:THENH=324:IF=325:THENH=325:IF=326:THENH=326
1190 IF=327:THENH=327:IF=328:THENH=328:IF=329:THENH=329
1200 IF=330:THENH=330:IF=331:THENH=331:IF=332:THENH=332
1210 IF=333:THENH=333:IF=334:THENH=334:IF=335:THENH=335
1220 IF=336:THENH=336:IF=337:THENH=337:IF=338:THENH=338
1230 IF=339:THENH=339:IF=340:THENH=340:IF=341:THENH=341
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1250 IF=345:THENH=345:IF=346:THENH=346:IF=347:THENH=347
1260 IF=348:THENH=348:IF=349:THENH=349:IF=350:THENH=350
1270 IF=351:THENH=351:IF=352:THENH=352:IF=353:THENH=353
1280 IF=354:THENH=354:IF=355:THENH=355:IF=356:THENH=356
1290 IF=357:THENH=357:IF=358:THENH=358:IF=359:THENH=359
1300 IF=360:THENH=360:IF=361:THENH=361:IF=362:THENH=362
1310 IF=363:THENH=363:IF=364:THENH=364:IF=365:THENH=365
1320 IF=366:THENH=366:IF=367:THENH=367:IF=368:THENH=368
1330 IF=369:THENH=369:IF=370:THENH=370:IF=371:THENH=371
1340 IF=372:THENH=372:IF=373:THENH=373:IF=374:THENH=374
1350 IF=375:THENH=375:IF=376:THENH=376:IF=377:THENH=377
1360 IF=378:THENH=378:IF=379:THENH=379:IF=380:THENH=380
1370 IF=381:THENH=381:IF=382:THENH=382:IF=383:THENH=383
1380 IF=384:THENH=384:IF=385:THENH=385:IF=386:THENH=386
1390 IF=387:THENH=387:IF=388:THENH=388:IF=389:THENH=389
1400 IF=390:THENH=390:IF=391:THENH=391:IF=392:THENH=392
1410 IF=393:THENH=393:IF=394:THENH=394:IF=395:THENH=395
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1520 IF=426:THENH=426:IF=427:THENH=427:IF=428:THENH=428
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1550 IF=435:THENH=435:IF=436:THENH=436:IF=437:THENH=437
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1590 IF=447:THENH=447:IF=448:THENH=448:IF=449:THENH=449
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1610 IF=453:THENH=453:IF=454:THENH=454:IF=455:THENH=455
1620 IF=456:THENH=456:IF=457:THENH=457:IF=458:THENH=458
1630 IF=459:THENH=459:IF=460:THENH=460:IF=461:THENH=461
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1690 IF=477:THENH=477:IF=478:THENH=478:IF=479:THENH=479
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1710 IF=483:THENH=483:IF=484:THENH=484:IF=485:THENH=485
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1800 IF=510:THENH=510:IF=511:THENH=511:IF=512:THENH=512
1810 IF=513:THENH=513:IF=514:THENH=514:IF=515:THENH=515
1820 IF=516:THENH=516:IF=517:THENH=517:IF=518:THENH=518
1830 IF=519:THENH=519:IF=520:THENH=520:IF=521:THENH=521
1840 IF=522:THENH=522:IF=523:THENH=523:IF=524:THENH=524
1850 IF=525:THENH=525:IF=526:THENH=526:IF=527:THENH=527
1860 IF=528:THENH=528:IF=529:THENH=529:IF=530:THENH=530
1870 IF=531:THENH=531:IF=532:THENH=532:IF=533:THENH=533
1880 IF=534:THENH=534:IF=535:THENH=535:IF=536:THENH=536
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1910 IF=543:THENH=543:IF=544:THENH=544:IF=545:THENH=545
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1930 IF=549:THENH=549:IF=550:THENH=550:IF=551:THENH=551
1940 IF=552:THENH=552:IF=553:THENH=553:IF=554:THENH=554
1950 IF=555:THENH=555:IF=556:THENH=556:IF=557:THENH=557
1960 IF=558:THENH=558:IF=559:THENH=559:IF=560:THENH=560
1970 IF=561:THENH=561:IF=562:THENH=562:IF=563:THENH=563
1980 IF=564:THENH=564:IF=565:THENH=565:IF=566:THENH=566
1990 IF=567:THENH=567:IF=568:THENH=568:IF=569:THENH=569
2000 IF=570:THENH=570:IF=571:THENH=571:IF=572:THENH=572
2010 IF=573:THENH=573:IF=574:THENH=574:IF=575:THENH=575
2020 IF=576:THENH=576:IF=577:THENH=577:IF=578:THENH=578
2030 IF=579:THENH=579:IF=580:THENH=580:IF=581:THENH=581
2040 IF=582:THENH=582:IF=583:THENH=583:IF=584:THENH=584
2050 IF=585:THENH=585:IF=586:THENH=586:IF=587:THENH=587
2060 IF=588:THENH=588:IF=589:THENH=589:IF=590:THENH=590
2070 IF=591:THENH=591:IF=592:THENH=592:IF=593:THENH=593
2080 IF=594:THENH=594:IF=595:THENH=595:IF=596:THENH=596
2090 IF=597:THENH=597:IF=598:THENH=598:IF=599:THENH=599
2100 IF=600:THENH=600:IF=601:THENH=601:IF=602:THENH=602
2110 IF=603:THENH=603:IF=604:THENH=604:IF=605:THENH=605
2120 IF=606:THENH=606:IF=607:THENH=607:IF=608:THENH=608
2130 IF=609:THENH=609:IF=610:THENH=610:IF=611:THENH=611
2140 IF=612:THENH=612:IF=613:THENH=613:IF=614:THENH=614
2150 IF=615:THENH=615:IF=616:THENH=616:IF=617:THENH=617
2160 IF=618:THENH=618:IF=619:THENH=619:IF=620:THENH=620
2170 IF=621:THENH=621:IF=622:THENH=622:IF=623:THENH=623
2180 IF=624:THENH=624:IF=625:THENH=625:IF=626:THENH=626
2190 IF=627:THENH=627:IF=628:THENH=628:IF=629:THENH=629
2200 IF=630:THENH=630:IF=631:THENH=631:IF=632:THENH=632
2210 IF=633:THENH=633:IF=634:THENH=634:IF=635:THENH=635
2220 IF=636:THENH=636:IF=637:THENH=637:IF=638:THENH=638
2230 IF=639:THENH=639:IF=640:THENH=640:IF=641:THENH=641
2240 IF=642:THENH=642:IF=643:THENH=643:IF=644:THENH=644
2250 IF=645:THENH=645:IF=646:THENH=646:IF=647:THENH=647
2260 IF=648:THENH=648:IF=649:THENH=649:IF=650:THENH=650
2270 IF=651:THENH=651:IF=652:THENH=652:IF=653:THENH=653
2280 IF=654:THENH=654:IF=655:THENH=655:IF=656:THENH=656
2290 IF=657:THENH=657:IF=658:THENH=658:IF=659:THENH=659
2300 IF=660:THENH=660:IF=661:THENH=661:IF=662:THENH=662
2310 IF=663:THENH=663:IF=664:THENH=664:IF=665:THENH=665
2320 IF=666:THENH=666:IF=667:THENH=667:IF=668:THENH=668
2330 IF=669:THENH=669:IF=670:THENH=670:IF=671:THENH=671
2340 IF=672:THENH=672:IF=673:THENH=673:IF=674:THENH=674
2350 IF=675:THENH=675:IF=676:THENH=676:IF=677:THENH=677
2360 IF=678:THENH=678:IF=679:THENH=679:IF=680:THENH=680
2370 IF=681:THENH=681:IF=682:THENH=682:IF=683:THENH=683
2380 IF=684:THENH=684:IF=685:THENH=685:IF=686:THENH=686
2390 IF=687:THENH=687:IF=688:THENH=688:IF=689:THENH=689
2400 IF=690:THENH=690:IF=691:THENH=691:IF=692:THENH=692
2410 IF=693:THENH=693:IF=694:THENH=694:IF=695:THENH=695
2420 IF=696:THENH=696:IF=697:THENH=697:IF=698:THENH=698
2430 IF=699:THENH=699:IF=700:THENH=700:IF=701:THENH=701
2440 IF=702:THENH=702:IF=703:THENH=703:IF=704:THENH=704
2450 IF=705:THENH=705:IF=706:THENH=706:IF=707:THENH=707
2460 IF=708:THENH=708:IF=709:THENH=709:IF=710:THENH=710
2470 IF=711:THENH=711:IF=712:THENH=712:IF=713:THENH=713
2480 IF=71
```

Scribble

on ZX81

Scribble is word-processing with a difference. It is a game for thinkers and might even improve your word power. Be warned though — it can be addictive.

After the computer has printed out the board (line 2000) a letter will appear, with its value, at the bottom. Using the arrowed keys, you should move it on to one of the randomly-printed squares (lines 2025 to 2050) as part of a word. When the letter is in place, press P to park it, and press L to get another.

There are penalties for hitting another letter, and if you cannot use a letter then you can throw it into the bin and another will replace it. All the rules are contained within the program.

You are, of course, seeking the highest score possible, but you must weigh the chances of increasing your score by waiting for the right letter to appear, against the loss of points each time you win an unwanted letter. It is up to you to cut and run to reduce any losses by pressing S to finish the game before all the squares are filled, or waiting for the right letters to appear, to increase your score.

Figure 2 shows what can happen when you wait to finish all the words — a score of

minus 581; whereas Figure 3 shows a score of just eight, after 10 points were deducted from the score for each unfilled square. Figure 1 shows a newly-drawn board.

The program makes use of *Peek* and *Poke* to work as fast as possible, and pressing S stops the game, scans the board, and prints the score (lines 3000 to 3240).

You must decide which words are eligible for the game, and for the correct spelling, so a good dictionary is clearly a useful add-on for your ZX81 for this game — unless you know how to put the whole of the Oxford Dictionary into the remains of your 16K memory.

```

50 REM "SCRIBBLE"
50 FAST
70 LET HS=100
80 DIM D(9)
90 GOSUB 4000
100 GOSUB 2000
1000 LET T=0
1005 LET U=0
1010 LET PA=(PEEK 16396+255+PEEK
16397)+459
1020 LET SPA=PA
1030 PRINT AT 21,14;" ";AT 21
14,T
1055 LET Q=INT (38+RND*26)
1062 LET W=INT (6/6)
1065 PRINT AT 19,19;" ";AT 19,1
9:U
1070 POKE PA,Q
1075 SLOW
1080 LET MPA=PA+(INKEY$="S")+33-
(INKEY$="7")+33+(INKEY$="8")-(IN
KEY$="5")
1090 LET SPA=MPA
1100 IF INKEY$="P" THEN GOTO 119
0
1110 IF INKEY$="S" THEN GOTO 300
0
1120 IF PEEK MPA=120 THEN GOTO 1
070
1130 IF PEEK MPA=130 OR PEEK MPA
20 THEN POKE MPA,0
1140 IF PEEK MPA<>0 THEN GOTO 13
00
1150 IF PEEK MPA<>0 THEN LET T=T
-U
1155 IF PEEK MPA<>0 THEN GOTO 10
50
1160 POKE PA,0
1170 LET PA=MPA
1180 GOTO 1070
1190 REM PARK LTR AND RENEW
1192 LET T=T+U
1195 LET U=U+1
1200 LET F(U)=SPA
1210 LET G(U)=0
1220 POKE SPA,0
1230 LET PA=0
1240 FOR I=1 TO 4
1250 PRINT AT 17,0;" ";AT 17,0;"PRESS L"
"AT 17,0;" ";AT 17,0;" "
1260 NEXT I
1270 LET OS=INKEY$
1275 IF OS<>"L" THEN GOTO 1270
1280 PRINT AT 18,0;" "
1285 PRINT AT 19,19;" "
1287 LET T=T+U
1290 GOTO 1070
1300 REM CHANGE IF IN COLLISION
1310 POKE PA,0
1320 LET PA=SA
1330 GOTO 1150
2000 REM PRINT BOARD
2005 FAST
2010 DIM F(250)
2015 DIM G(250)
2018 PRINT AT 19,0;"THIS LETTER
WORTH:"
2020 PRINT AT 21,0;" "
2025 LET US=" "

```

```

2030 FOR I=1 TO 9
2035 LET D(I)=(INT (1+RND*7))+1)
2040 NEXT I
2050 PRINT AT 2,3;US( TO D(1));A
T 5,3;US( TO D(2));AT 8,3;US( TO
D(3));AT 11,3;US( TO D(4));
2060 PRINT AT 2,12;US( TO D(5));
AT 5,12;US( TO D(6));AT 8,12;US(
TO D(7));AT 11,12;US( TO D(8));
AT 14,12;US( TO D(9))
2070 PRINT AT 6,0;" "
2080 FOR I=1 TO 15
2090 PRINT " ";TAB 21;" "
2100 NEXT I
2110 PRINT AT 16,0;" "
2150 PRINT AT 13,1;" ";AT 14,1
" ";AT 15,1;" "
2170 PRINT AT 6,23;"THIS IS";AT
1,23;" "
2180 PRINT AT 2,23;"SCRIBBLE";AT
3,23;" "
2190 PRINT AT 5,23;"HIGHEST";AT
6,23;"SCORE";AT 7,23;"SO FAR:"
2200 PRINT AT 8,24;HS
2210 RETURN
3000 REM SCORE REPORT
3010 FAST
3020 CLS
3030 GOSUB 2050
3040 FOR I=1 TO U
3050 POKE F(I),G(I)
3060 NEXT I
3070 LET L=0
3080 FOR I=PA-434 TO PA+47
3090 IF PEEK I=130 OR PEEK I=0 T
HEN LET L=L+10
3100 NEXT I
3110 SLOW
3120 PRINT AT 1,23;"YOUR ";AT
3,23;" CARD
3130 PRINT AT 10,23;"YOUR";AT 11
,23;"SCORE:"
3140 LET T=T+L
3150 PRINT AT 12,24;T
3160 IF T>HS THEN PRINT AT 14,23
;"WELL DONE";AT 15,23;" "
3170 AT 16,23;"THE BEST";AT 17,23;"
"
3170 IF T>HS THEN LET HS=T
3180 FOR I=1 TO 50
3190 NEXT I
3200 PRINT AT 19,23;"ANOTHER";AT
20,23;"GAME ?";AT 21,23;" (Y/N)
"
3210 IF INKEY$="Y" THEN GOTO 3210
3220 IF INKEY$<"Y" THEN STOP
3230 CLS
3240 GOTO 100
4000 REM INSTRUCTIONS
4010 PRINT TAB 6;"WELCOME TO SCR
IBBLE";TAB 6;" "
4020 PRINT
4030 PRINT "SCRIBBLE IS A WORD G
AME. TRY TO "
4040 PRINT "FORM WORDS IN THE
PRINTED "
4050 PRINT "SQUARES USING ALL THE
SQUARES."
4060 PRINT "IF POSSIBLE."
4070 PRINT
4080 PRINT "USE THE ARROWED KEYS

```



```

(5,6,7,"AND 8) TO MOVE EACH LETTER INTO "POSITION, AND PRESS "P" TO "PARK IT ONCE IT IS IN PLACE."
4050 PRINT
4070 PRINT "IF YOU CANNOT USE ANY LETTER, THEN TOSS IT INTO THE BIN, ON THE LEFT, ANOTHER WILL REPLACE IT, ALTHOUGH YOU WILL LOSE THE POINTS FOR THE LETTER, YOU DISCARD."
4080 GOSUB 5000
4090 PRINT "WHEN YOU HAVE FILLED ALL THE SQUARES, OR AS MANY AS YOU CAN, PRESS "S" - AFTER N/L - AND YOUR "SCORE WILL SHOW. (AFTER ABOUT "10 SECONDS)."
4100 PRINT
4110 PRINT "IF YOU HIT A PARKED LETTER, WITH ANOTHER ONE, YOU WILL LOSE "THE NEW LETTER AND THE POINTS, "FOR IT. FOR EACH UNFILLED "SQUARE, 10 POINTS WILL BE DEDUCTED FROM THE SCORE."
4120 PRINT
4130 PRINT "IF YOU RUB OUT ANY SQUARE WHEN "YOU ARE MOVING LETTERS, YOU "SHOULD STILL FILL THAT SPACE, WITH A LETTER, OR 10 POINTS WILL BE DEDUCTED FROM THE SCORE."
4140 PRINT
4150 PRINT "HAVE FUN -", "NOW..."
4160 GOSUB 5000
4170 RETURN
5000 REM PAGE CHANGE
5010 SLOW
5020 FOR I=1 TO 10
5030 PRINT AT 21,0:" ";AT 21,0:"PRES

```

```

5 N/ "AT 21,0;" "AT 21
5040 NEXT I
5050 INPUT 0$
5060 CLS
5070 RETURN
5080 STOP
5090 SAVE "SCRIBBLE"
5010 RUN
NOTE: LINE 2025=ALTERNATE GRAPHIC "A" AND GRAPHIC "H"

```

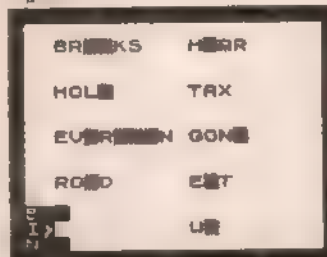
Figure 1



THIS LETTER WORTH: 10

100

Figure 3



THIS IS
YOUR
SCRIBBLE
CARD

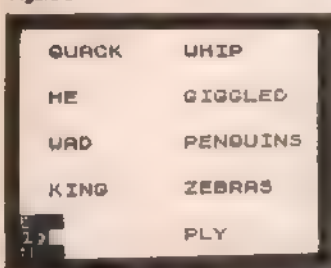
HIGHEST
SCORE
SO FAR:
100

YOUR
SCORE:
0

ANOTHER
GAME ?
(Y/N)

Scribble
by Ron Luxton

Figure 2



THIS IS
YOUR
SCRIBBLE
CARD

HIGHEST
SCORE
SO FAR:
100

YOUR
SCORE:
-581

ANOTHER
GAME ?
(Y/N)

Banners

on Spectrum

This is a very simple but effective program

for the Spectrum and Printer.

You will see that it can produce very effective banners and notices.

The program uses the Point function provided as a keyword on the Spectrum,

but not explained in the manual. By using this technique it is easy to incorporate user-defined graphics into the print-out.

Wider letters can be made by extending the loop set up by line 60.

```

10 REM **SPECTRUM BANNERS**
20 REM © RayBrad MCMLXXXIII
30 INPUT "Type Text (up to 32
chr$) and ENTER";a$
40 PRINT AT 0,0;a$
50 FOR x=0 TO LEN a$-1
60 FOR y=1 TO 2
70 FOR z=160 TO 175
80 FOR z=1 TO 4
90 IF POINT (x,y)=1 THEN LPRIN
T " "
100 IF POINT (x,y)=0 THEN LPRIN
T " "
110 NEXT z
120 NEXT y
130 NEXT x
140 NEXT x

```

Banners
by Ray Bradley

Triangle

on BBC Micro

This simple program for the BBC Micro

calculates the area of a triangle. It is designed to have some educational value

in that it shows you how the formula is used.

```
10 REM BY IAN BROWN AND STEPHEN
    LOWES
20 MODE 2
30 VDU19,1,0,0,0,0,19,0,0,0,0,0
40 GCOL0,3
50 MOVE 200,400
60 DRAW200,850
70 DRAW 500,400
80 PL0T85,200,400
90 MOVE 800,400
100 DRAW 1000,850
110 DRAW 1200,400
120 PL0T 85,800,400
130 GCOL0,4
140 MOVE100,400
150 DRAW100,850
160 MOVE 70,440
170 DRAW 100,400
180 DRAW 130,440
190 MOVE 70,810
200 DRAW 100,850
210DRAW 130,810
220 MOVE 700,400
230 DRAW 700,850
240 MOVE 670,440
250 DRAW 700,400
```

```
260 DRAW 730,440
270 MOVE 670,810
280 DRAW 700,850
290 DRAW 730,810
300 PRINTTAB(0,12)"H"
310 PRINTTAB(9,12)"H"
320 PRINTTAB(4,1)"TRIANGLE AREA"
330 PRINTTAB(3,20)"BASE          BASE"
340 COLOUR1
350 PRINTTAB(3,22)"Equation used"
360 PRINTTAB(0,24)"AREA=0.5 X BASE
    X H"
370 PRINT
380 INPUT"INP.BASE";B
390 INPUT"INP.H";H
400 A=0.5*B*H
410 COLOUR 9
420 PRINT
430 PRINT"    AREA=";A
440 COLOUR 1
450 PRINT
460 INPUT"          AGAIN (Y/N)";Y$
470 IF Y$="Y" THEN GOTO 20
480 MODE 7
490 CLS
500 END
```

Triangle
by Ian Brown

Stomper

on Spectrum

This game requires both speed and logical thought. There are six skill levels and successive frames become faster and faster.

The problem before you is to control a boot in order to stamp out the ever shortening fuse on a series of bombs. When you have managed this a new frame begins with faster burning fuses.

Your boot moves around the screen using stepping stones which disappear once they have been used. Wrap around operates in all directions and becomes essential at the higher skill levels.

If things become really difficult two extra controls allow you to rotate the line on which you are sitting either left or right independently of the boot. However, just to make life a little more difficult, there are four skulls at random positions on the screen, hitting one of these will send your boot crashing to the bottom of the screen.

There is a facility for recording the name of the highest scorer. The controls are as follows:

'l' move left
'o' move right
'w' move up
's' move down
'r' rotate line left
'R' rotate line right

The main routines in the program are all Rem labelled. When making any altera-

tions to the program it is worth remembering that several of the variables are used more than once to help keep the program running at a reasonable speed.

Due to the large graphic display there is no room on the screen for a running display of the score, this is displayed at the end of each frame. You score for every stepping stone and each bomb. The bombs score higher the quicker they are stamped out.

As the game progresses and the fuses burn faster these scores increase, so some pretty impressive scores are possible on the lowest levels.

**PROGRAM OF
THE WEEK**

```
5 DIM I(16): RANDOMIZE : GO 1
10 9000: GO SUB 4000: LET score
0: LET level=1: LET hi=0
10 PAPER 7: INK 2: BORDER 7
20 LET col=0: CLS: SCREEN*****
30 REM *****DRAW SKULLS*****
40 FOR a=0 TO 3: LET a=1+INT
    (RND*(5)+1)*3 OR 1+4: LET b=1+I
    NT (RND*(3)+7)*3 OR 1+4
50 PRINT AT a/2,b/2: INK 0;"X"
60 AT a/2+1,b/2: INK 0;"X"
70 NEXT a
80 REM *****MOVE BOOT*****
90 LET a=0: LET b=0
100 GO SUB 5000: GO TO 2010
110 GO SUB 6000: IF INKEY$="" THEN
    GO TO 1000
```

```
1210 IF INKEY$="l" THEN LET b=b-1
130 LET a=a: IF b=0 THEN LET b=
    30
1400 IF INKEY$="o" THEN LET b=b+1
150 LET a=a: IF b=40 THEN LET b=
    0
1600 IF INKEY$="w" THEN LET a=a-1
170 LET b=b: IF a=0 THEN LET a=
    30
1800 IF INKEY$="s" THEN LET a=a+1
190 LET b=b: IF a=40 THEN LET a=
    0
2000 IF INKEY$="r" THEN LET a=a-1
2100 IF INKEY$="R" THEN LET a=a+1
2200 IF INKEY$="X" THEN LET a=a-1
2300 IF INKEY$="X" THEN LET a=a+1
2400 IF INKEY$="X" THEN LET a=a-1
2500 IF INKEY$="X" THEN LET a=a+1
2600 IF INKEY$="X" THEN LET a=a-1
2700 IF INKEY$="X" THEN LET a=a+1
2800 IF INKEY$="X" THEN LET a=a-1
2900 IF INKEY$="X" THEN LET a=a+1
3000 IF INKEY$="X" THEN LET a=a-1
3100 IF INKEY$="X" THEN LET a=a+1
3200 IF INKEY$="X" THEN LET a=a-1
3300 IF INKEY$="X" THEN LET a=a+1
3400 IF INKEY$="X" THEN LET a=a-1
3500 IF INKEY$="X" THEN LET a=a+1
3600 IF INKEY$="X" THEN LET a=a-1
3700 IF INKEY$="X" THEN LET a=a+1
3800 IF INKEY$="X" THEN LET a=a-1
3900 IF INKEY$="X" THEN LET a=a+1
4000 IF INKEY$="X" THEN LET a=a-1
4100 IF INKEY$="X" THEN LET a=a+1
4200 IF INKEY$="X" THEN LET a=a-1
4300 IF INKEY$="X" THEN LET a=a+1
4400 IF INKEY$="X" THEN LET a=a-1
4500 IF INKEY$="X" THEN LET a=a+1
4600 IF INKEY$="X" THEN LET a=a-1
4700 IF INKEY$="X" THEN LET a=a+1
4800 IF INKEY$="X" THEN LET a=a-1
4900 IF INKEY$="X" THEN LET a=a+1
5000 IF INKEY$="X" THEN LET a=a-1
5100 IF INKEY$="X" THEN LET a=a+1
5200 IF INKEY$="X" THEN LET a=a-1
5300 IF INKEY$="X" THEN LET a=a+1
5400 IF INKEY$="X" THEN LET a=a-1
5500 IF INKEY$="X" THEN LET a=a+1
5600 IF INKEY$="X" THEN LET a=a-1
5700 IF INKEY$="X" THEN LET a=a+1
5800 IF INKEY$="X" THEN LET a=a-1
5900 IF INKEY$="X" THEN LET a=a+1
6000 IF INKEY$="X" THEN LET a=a-1
6100 IF INKEY$="X" THEN LET a=a+1
6200 IF INKEY$="X" THEN LET a=a-1
6300 IF INKEY$="X" THEN LET a=a+1
6400 IF INKEY$="X" THEN LET a=a-1
6500 IF INKEY$="X" THEN LET a=a+1
6600 IF INKEY$="X" THEN LET a=a-1
6700 IF INKEY$="X" THEN LET a=a+1
6800 IF INKEY$="X" THEN LET a=a-1
6900 IF INKEY$="X" THEN LET a=a+1
7000 IF INKEY$="X" THEN LET a=a-1
7100 IF INKEY$="X" THEN LET a=a+1
7200 IF INKEY$="X" THEN LET a=a-1
7300 IF INKEY$="X" THEN LET a=a+1
7400 IF INKEY$="X" THEN LET a=a-1
7500 IF INKEY$="X" THEN LET a=a+1
7600 IF INKEY$="X" THEN LET a=a-1
7700 IF INKEY$="X" THEN LET a=a+1
7800 IF INKEY$="X" THEN LET a=a-1
7900 IF INKEY$="X" THEN LET a=a+1
8000 IF INKEY$="X" THEN LET a=a-1
8100 IF INKEY$="X" THEN LET a=a+1
8200 IF INKEY$="X" THEN LET a=a-1
8300 IF INKEY$="X" THEN LET a=a+1
8400 IF INKEY$="X" THEN LET a=a-1
8500 IF INKEY$="X" THEN LET a=a+1
8600 IF INKEY$="X" THEN LET a=a-1
8700 IF INKEY$="X" THEN LET a=a+1
8800 IF INKEY$="X" THEN LET a=a-1
8900 IF INKEY$="X" THEN LET a=a+1
9000 IF INKEY$="X" THEN LET a=a-1
9100 IF INKEY$="X" THEN LET a=a+1
9200 IF INKEY$="X" THEN LET a=a-1
9300 IF INKEY$="X" THEN LET a=a+1
9400 IF INKEY$="X" THEN LET a=a-1
9500 IF INKEY$="X" THEN LET a=a+1
9600 IF INKEY$="X" THEN LET a=a-1
9700 IF INKEY$="X" THEN LET a=a+1
9800 IF INKEY$="X" THEN LET a=a-1
9900 IF INKEY$="X" THEN LET a=a+1
10000 IF INKEY$="X" THEN LET a=a-1
10100 IF INKEY$="X" THEN LET a=a+1
10200 IF INKEY$="X" THEN LET a=a-1
10300 IF INKEY$="X" THEN LET a=a+1
10400 IF INKEY$="X" THEN LET a=a-1
10500 IF INKEY$="X" THEN LET a=a+1
10600 IF INKEY$="X" THEN LET a=a-1
10700 IF INKEY$="X" THEN LET a=a+1
10800 IF INKEY$="X" THEN LET a=a-1
10900 IF INKEY$="X" THEN LET a=a+1
11000 IF INKEY$="X" THEN LET a=a-1
11100 IF INKEY$="X" THEN LET a=a+1
11200 IF INKEY$="X" THEN LET a=a-1
11300 IF INKEY$="X" THEN LET a=a+1
11400 IF INKEY$="X" THEN LET a=a-1
11500 IF INKEY$="X" THEN LET a=a+1
11600 IF INKEY$="X" THEN LET a=a-1
11700 IF INKEY$="X" THEN LET a=a+1
11800 IF INKEY$="X" THEN LET a=a-1
11900 IF INKEY$="X" THEN LET a=a+1
12000 IF INKEY$="X" THEN LET a=a-1
12100 IF INKEY$="X" THEN LET a=a+1
12200 IF INKEY$="X" THEN LET a=a-1
12300 IF INKEY$="X" THEN LET a=a+1
12400 IF INKEY$="X" THEN LET a=a-1
12500 IF INKEY$="X" THEN LET a=a+1
12600 IF INKEY$="X" THEN LET a=a-1
12700 IF INKEY$="X" THEN LET a=a+1
12800 IF INKEY$="X" THEN LET a=a-1
12900 IF INKEY$="X" THEN LET a=a+1
13000 IF INKEY$="X" THEN LET a=a-1
13100 IF INKEY$="X" THEN LET a=a+1
13200 IF INKEY$="X" THEN LET a=a-1
13300 IF INKEY$="X" THEN LET a=a+1
13400 IF INKEY$="X" THEN LET a=a-1
13500 IF INKEY$="X" THEN LET a=a+1
13600 IF INKEY$="X" THEN LET a=a-1
13700 IF INKEY$="X" THEN LET a=a+1
13800 IF INKEY$="X" THEN LET a=a-1
13900 IF INKEY$="X" THEN LET a=a+1
14000 IF INKEY$="X" THEN LET a=a-1
14100 IF INKEY$="X" THEN LET a=a+1
14200 IF INKEY$="X" THEN LET a=a-1
14300 IF INKEY$="X" THEN LET a=a+1
14400 IF INKEY$="X" THEN LET a=a-1
14500 IF INKEY$="X" THEN LET a=a+1
14600 IF INKEY$="X" THEN LET a=a-1
14700 IF INKEY$="X" THEN LET a=a+1
14800 IF INKEY$="X" THEN LET a=a-1
14900 IF INKEY$="X" THEN LET a=a+1
15000 IF INKEY$="X" THEN LET a=a-1
15100 IF INKEY$="X" THEN LET a=a+1
15200 IF INKEY$="X" THEN LET a=a-1
15300 IF INKEY$="X" THEN LET a=a+1
15400 IF INKEY$="X" THEN LET a=a-1
15500 IF INKEY$="X" THEN LET a=a+1
15600 IF INKEY$="X" THEN LET a=a-1
15700 IF INKEY$="X" THEN LET a=a+1
15800 IF INKEY$="X" THEN LET a=a-1
15900 IF INKEY$="X" THEN LET a=a+1
16000 IF INKEY$="X" THEN LET a=a-1
16100 IF INKEY$="X" THEN LET a=a+1
16200 IF INKEY$="X" THEN LET a=a-1
16300 IF INKEY$="X" THEN LET a=a+1
16400 IF INKEY$="X" THEN LET a=a-1
16500 IF INKEY$="X" THEN LET a=a+1
16600 IF INKEY$="X" THEN LET a=a-1
16700 IF INKEY$="X" THEN LET a=a+1
16800 IF INKEY$="X" THEN LET a=a-1
16900 IF INKEY$="X" THEN LET a=a+1
17000 IF INKEY$="X" THEN LET a=a-1
17100 IF INKEY$="X" THEN LET a=a+1
17200 IF INKEY$="X" THEN LET a=a-1
17300 IF INKEY$="X" THEN LET a=a+1
17400 IF INKEY$="X" THEN LET a=a-1
17500 IF INKEY$="X" THEN LET a=a+1
17600 IF INKEY$="X" THEN LET a=a-1
17700 IF INKEY$="X" THEN LET a=a+1
17800 IF INKEY$="X" THEN LET a=a-1
17900 IF INKEY$="X" THEN LET a=a+1
18000 IF INKEY$="X" THEN LET a=a-1
18100 IF INKEY$="X" THEN LET a=a+1
18200 IF INKEY$="X" THEN LET a=a-1
18300 IF INKEY$="X" THEN LET a=a+1
18400 IF INKEY$="X" THEN LET a=a-1
18500 IF INKEY$="X" THEN LET a=a+1
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55300 IF INKEY$="X" THEN LET a=a+1
55400 IF INKEY$="X" THEN LET a=a-1
55500 IF INKEY
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1200 IF ATTR (A1,B1)=57 THEN L8
1210 LOCATE 5,1:PRINT "1001" :GOTO 1100
1220 PRINT AT 5,1:GOTO 3000
3010 A=INKEY$
3020 LET B=ASC A
3030 PRINT AT 5,1:INKEY$
3040 IF B=13 THEN GOTO 1100
3050 IF B=27 THEN GOTO 1100
3060 IF B=57 THEN GOTO 1100
3070 IF B=5 THEN GOTO 1100
3080 IF B=10 THEN GOTO 1100
3090 IF B=15 THEN GOTO 1100
3100 IF B=20 THEN GOTO 1100
3110 IF B=25 THEN GOTO 1100
3120 IF B=30 THEN GOTO 1100
3130 IF B=35 THEN GOTO 1100
3140 IF B=40 THEN GOTO 1100
3150 IF B=45 THEN GOTO 1100
3160 IF B=50 THEN GOTO 1100
3170 IF B=55 THEN GOTO 1100
3180 IF B=60 THEN GOTO 1100
3190 IF B=65 THEN GOTO 1100
3200 IF B=70 THEN GOTO 1100
3210 IF B=75 THEN GOTO 1100
3220 IF B=80 THEN GOTO 1100
3230 IF B=85 THEN GOTO 1100
3240 IF B=90 THEN GOTO 1100
3250 IF B=95 THEN GOTO 1100
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3990 IF B=465 THEN GOTO 1100
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4170 IF B=555 THEN GOTO 1100
4180 IF B=560 THEN GOTO 1100
4190 IF B=565 THEN GOTO 1100
4200 IF B=570 THEN GOTO 1100
4210 IF B=575 THEN GOTO 1100
4220 IF B=580 THEN GOTO 1100
4230 IF B=585 THEN GOTO 1100
4240 IF B=590 THEN GOTO 1100
4250 IF B=595 THEN GOTO 1100
4260 IF B=600 THEN GOTO 1100
4270 IF B=605 THEN GOTO 1100
4280 IF B=610 THEN GOTO 1100
4290 IF B=615 THEN GOTO 1100
4300 IF B=620 THEN GOTO 1100
4310 IF B=625 THEN GOTO 1100
4320 IF B=630 THEN GOTO 1100
4330 IF B=635 THEN GOTO 1100
4340 IF B=640 THEN GOTO 1100
4350 IF B=645 THEN GOTO 1100
4360 IF B=650 THEN GOTO 1100
4370 IF B=655 THEN GOTO 1100
4380 IF B=660 THEN GOTO 1100
4390 IF B=665 THEN GOTO 1100
4400 IF B=670 THEN GOTO 1100
4410 IF B=675 THEN GOTO 1100
4420 IF B=680 THEN GOTO 1100
4430 IF B=685 THEN GOTO 1100
4440 IF B=690 THEN GOTO 1100
4450 IF B=695 THEN GOTO 1100
4460 IF B=700 THEN GOTO 1100
4470 IF B=705 THEN GOTO 1100
4480 IF B=710 THEN GOTO 1100
4490 IF B=715 THEN GOTO 1100
4500 IF B=720 THEN GOTO 1100
4510 IF B=725 THEN GOTO 1100
4520 IF B=730 THEN GOTO 1100
4530 IF B=735 THEN GOTO 1100
4540 IF B=740 THEN GOTO 1100
4550 IF B=745 THEN GOTO 1100
4560 IF B=750 THEN GOTO 1100
4570 IF B=755 THEN GOTO 1100
4580 IF B=760 THEN GOTO 1100
4590 IF B=765 THEN GOTO 1100
4600 IF B=770 THEN GOTO 1100
4610 IF B=775 THEN GOTO 1100
4620 IF B=780 THEN GOTO 1100
4630 IF B=785 THEN GOTO 1100
4640 IF B=790 THEN GOTO 1100
4650 IF B=795 THEN GOTO 1100
4660 IF B=800 THEN GOTO 1100
4670 IF B=805 THEN GOTO 1100
4680 IF B=810 THEN GOTO 1100
4690 IF B=815 THEN GOTO 1100
4700 IF B=820 THEN GOTO 1100
4710 IF B=825 THEN GOTO 1100
4720 IF B=830 THEN GOTO 1100
4730 IF B=835 THEN GOTO 1100
4740 IF B=840 THEN GOTO 1100
4750 IF B=845 THEN GOTO 1100
4760 IF B=850 THEN GOTO 1100
4770 IF B=855 THEN GOTO 1100
4780 IF B=860 THEN GOTO 1100
4790 IF B=865 THEN GOTO 1100
4800 IF B=870 THEN GOTO 1100
4810 IF B=875 THEN GOTO 1100
4820 IF B=880 THEN GOTO 1100
4830 IF B=885 THEN GOTO 1100
4840 IF B=890 THEN GOTO 1100
4850 IF B=895 THEN GOTO 1100
4860 IF B=900 THEN GOTO 1100
4870 IF B=905 THEN GOTO 1100
4880 IF B=910 THEN GOTO 1100
4890 IF B=915 THEN GOTO 1100
4900 IF B=920 THEN GOTO 1100
4910 IF B=925 THEN GOTO 1100
4920 IF B=930 THEN GOTO 1100
4930 IF B=935 THEN GOTO 1100
4940 IF B=940 THEN GOTO 1100
4950 IF B=945 THEN GOTO 1100
4960 IF B=950 THEN GOTO 1100
4970 IF B=955 THEN GOTO 1100
4980 IF B=960 THEN GOTO 1100
4990 IF B=965 THEN GOTO 1100
5000 IF B=970 THEN GOTO 1100
5010 IF B=975 THEN GOTO 1100
5020 IF B=980 THEN GOTO 1100
5030 IF B=985 THEN GOTO 1100
5040 IF B=990 THEN GOTO 1100
5050 IF B=995 THEN GOTO 1100
5060 IF B=1000 THEN GOTO 1100
5070 IF B=1005 THEN GOTO 1100
5080 IF B=1010 THEN GOTO 1100
5090 IF B=1015 THEN GOTO 1100
5100 IF B=1020 THEN GOTO 1100
5110 IF B=1025 THEN GOTO 1100
5120 IF B=1030 THEN GOTO 1100
5130 IF B=1035 THEN GOTO 1100
5140 IF B=1040 THEN GOTO 110
```

```

0040 FOR I=1 TO 12: PRINT AT 0,
0050 " ", AT 1,1: " BEEP .05,
0060 PAUSE 5: NEXT I
1000 PRINT 10, "FOR I=1 TO 20: IF
0070 THEN PRINT I: "1-12: INK 2
1000 PRINT AT 0, PAPER 2: INK
0080 .01: BEEP .05,1: NEXT I
1070 FOR I=1 TO 150: NEXT I
5000 REM *****DIFFICULTY*****
5010 POKE 23692,255: PRINT AT 21
0090 PAPER 7: PAUSE 5
5030 PRINT TAB 5: INK 3: "HOW BRA
5040 "VIOU 71: PAUSE 5
5050 PRINT TAB 9: "10000 EASY"
PAUSE 5
5060 PRINT TAB 9, "20000" PAUSE
0070
5080 PRINT TAB 9, "30000 MODERATE"
PAUSE 5
5090 PRINT TAB 9, "40000 DIFFICULT"
PAUSE 5
5100 PRINT TAB 9, "50000 VERY DIFFICULT"
ULIN: PAUSE 5
5090 PRINT TAB 9, "60000 IMPOSSIBLE"
PAUSE 5
5100 PRINT TAB 9, "70000 IMPOSSIBLE"
PAUSE 5: PRINT AT 5, "PICK A
NUMBER"
5110 LET A=CODE INKEY$: LET A=
48: IF A=1 OR A=6 THEN GO TO 511
00
5120 LET A:=A+3: (A=1)+5+(A=2)+7+
14+5: (A=3)+14+1+12+14+5: (A=4)+7+14+5
5130 REM A=1+NEXT STATE=2+5+5
5140 REM A=1+5+5 FOR A=1
5150 LET I:=A: GO TO 5160
4: BEEP 2,VAL I(1): BEEP 4,VAL
I(2): I: NEXT I
5170 FOR I=1 TO 300: NEXT I: LE
VEL=I:VAL I:CLS:PRINT AT 1,
0080 "LEVEL":VAL I:RESTORE
5190 PRINT TAB 8: "SCORE":500
PAUSE 100: GO TO 520
5200 REM *****ROTATE LEFT*****
5210 LET I(16)=I(15):LET I(15)=I
5220 FOR I=1 TO 15: LET I(1)=AT
5230 I(16):NEXT I
5240 IF I(1)=15 THEN PRINT AT
0090 I(1)+2: INK 2: " " AT 0+1,1+2,
GO TO 7000
7040 IF I(1)+1=50 THEN PRINT AT
0090 I(1)+2: INK 4: " " AT 0+1,1+2,
GO TO 7000
7050 IF I(1)=100 THEN PRINT AT
0090 I(1)+2: INK 6: " " AT 0+1,1+2,
GO TO 7000
7060 IF I(1)+1=57 THEN PRINT AT
0090 I(1)+2: INK 8: " " AT 0+1,1+2,
GO TO 7000
7070 IF I(1)+1=54 THEN PRINT AT
0090 I(1)+2: INK 10: " " AT 0+1,1+2,
GO TO 7000
7080 IF I(1)+1=51 THEN PRINT AT
0090 I(1)+2: INK 12: " " AT 0+1,1+2,
GO TO 7000
7090 IF I(1)+1=48 THEN PRINT AT
0090 I(1)+2: INK 14: " " AT 0+1,1+2,
GO TO 7000
7100 NEXT I
7110 RETURN
7500 REM *****ROTATE RIGHT*****
7510 LET I(1)=I(16):LET I(16)=I
7520 FOR I=1 TO 14: LET I(1)+2:
7530 IF I(1)=15: NEXT I
7540 FOR I=1 TO 15:
7550 IF I(1)+1=53 THEN PRINT AT
0090 I(1)+2: INK 2: " " AT 0+1,1+2,
GO TO 7000
7560 IF I(1)+1=50 THEN PRINT AT
0090 I(1)+2: INK 4: " " AT 0+1,1+2,
GO TO 7000
7570 IF I(1)+1=47 THEN PRINT AT
0090 I(1)+2: INK 6: " " AT 0+1,1+2,
GO TO 7000
7580 IF I(1)+1=44 THEN PRINT AT
0090 I(1)+2: INK 8: " " AT 0+1,1+2,
GO TO 7000
7590 IF I(1)+1=41 THEN PRINT AT
0090 I(1)+2: INK 10: " " AT 0+1,1+2,
GO TO 7000
7600 NEXT I

```

```

0010 RETURN
0020 REM *****HIT SMULL*****
0035 PRINT AT a,b, INK 4;"",AT
a+1,b,""
0040 FOR i:=1 TO 20: PRINT AT i-
1,2, INK 4;"",AT i+1,51;"",
0050 PRINT AT i,b1, INK 3;"",AT
i+1,b1;"",AT i,b1,""
0060 BEEP (21-i)/300,30-i: NEXT
i
0040 FOR i:=162 TO 135 STEP -1: F
PRINT AT 31,b1, INK 3; OVER 1; CH
R$(i+1):AT 32,b1; OVER 1;
CHR$(i+2):AT 33,b1; OVER 1;
CHR$(i+3):AT 34,b1; OVER 1;
0050 NEXT i
0060 PRINT AT 20,b1;"",AT 21,b
1, INK 3;"",AT 22,b1,""
0070 GO TO 0500
0020 REM *****EXPUSION*****
0010 BORDER 0: PAPER 0: RANDOMIZ
E BSR: BEEP 1,0: BEEP 1,0
0020 GO TO 0500
0030 REM *****BURN A BOMB*****
0040 IF 101=0 THEN RETURN
0050 LET i1=0: LET v1=INT (RND
*10)
0060 LET v1=INT (RND*15)+1: IF v1
=1 DO AT 11,2,v1+2,155 THEN
GO TO 110
0070 PRINT AT i1+2,v1+2, INK 1;"
",AT i1+2+1,v1+2, INK 1;"",
0080 RETURN
0030 REM *****BURN THE FUSE*****
0040 LET i1=0: LET v1=0: IF
v1=0 THEN GO TO 0200
0050 PRINT AT i1+2,v1+2, INK 1;"
",AT i1+2+1,v1+2, INK 1;"",
0060 RETURN
0030 REM *****GRAPHICS*****
0040 DATA 96,112,54,31,22,22,15,
10,0
0050 DATA 31,112,128,128,0,0,0,0
0060 DATA 96,112,192,128,128,128
,0,0
0070 DATA 121,110,13,10,0,0,0,0
0080 DATA 121,16,16,16,4,8,16,0
0090 DATA 16,122,128,15,0,0,0,0
0100 DATA 152,248,255,248,240,24
,0,0
0110 DATA 0,0,0,0,0,160,248,0
0120 DATA 255,255,255,224,0,0,0,0
0130 DATA 240,224,240,224,0,0,0,0
0140 DATA 0,0,0,136,198,144,138,
0
0150 DATA 62,255,33,10,17,0,88,
0
0160 DATA 176,61,38,32,244,281,
0
0170 FOR n:=150 TO 162: FOR i:=0 T
O 7:
0180 READ a: POKE USA CHR$(a+1),b
: NEXT i: NEXT n
0190 REM *****END OF GAME*****
0200 REM *****END OF GAME*****
0210 REM *****END OF GAME*****
0220 REM *****END OF GAME*****
0230 REM *****END OF GAME*****
0240 REM *****END OF GAME*****
0250 REM *****END OF GAME*****
0260 REM *****END OF GAME*****
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0890 REM *****END OF GAME*****
0900 REM *****END OF GAME*****
0910 REM *****END OF GAME*****
0920 REM *****END OF GAME*****
0930 REM *****END OF GAME*****
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0970 REM *****END OF GAME*****
0980 REM *****END OF GAME*****
0990 REM *****END OF GAME*****
1000 REM *****END OF GAME*****

```

Stomper
by B. Clayton

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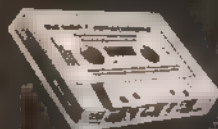
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Screen Dump

on BBC Micro

This procedure takes a little over a minute to produce a screen dump to an Epson printer — much faster than many previously published programs in Basic. A machine code dump would be about as fast, but would take much longer to type, and unless you are familiar with machine code, mistakes would be difficult to find and correct. The screen is copied on to the paper sideways — ie turned through 90

degrees — which will be adequate for most purposes.

The procedure is short enough to be typed in as part of another program, but an alternative would be to store it on tape as a procedure which can be added to programs, using the method explained on page 402 of the BBC Micro User Guide. In either case the procedure would be called by a *ProcDump* statement in the main program.

The procedure uses three loops, each using integer variables for greater speed. The D% loop steps across the screen

horizontally, one character space at a time. Inside this, the A% loop steps up the screen vertically, one character at a time, and lastly, inside this loop, the B% loop steps up the eight bytes which make up each character, taking one byte at a time. This means that the screen is copied to the printer starting at the bottom left-hand corner, going up the column to the top left-hand corner, then returning to the next character position at the bottom for the next column, and so on. The output to printer of each byte occurs at line 10090 with the use of the operator.

```
10000 REM *** MODE 4 MX80 F/T III DUMP by A.PIPER ***
10010 DEFPROCdump
10020 LOCAL A%,B%,D%
10030 VDU2
10040 VDU1,27,1,65,1,8
10050 FOR D%=22528 TO 22840 STEP 8
10060 VDU1,27,1,75,1,0,1,1
10070 FOR A%=D%+9920 TO D% STEP -320
10080 FOR B%=A%+7 TO A% STEP -1
10090 VDU1,?B%
10100 NEXT B%;NEXT A%
10110 VDU1,10
10120 NEXT D%
10130 VDU3
10140 ENDPROC
```

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these additional features help you to do things which are difficult or impossible on the current range of micros.

To enter the competition, simply fill out the accompanying form and send it, together with your essay, to:
**Popular Computing Weekly
Lynx Competition
12-13 Little Newport Street
London WC2R 3LD**

Rules

- (1) Each entry must consist of a 1,000-word essay, preferably typed double spaced on one side of the paper only, together with a completed entry form.
- (2) All entrants must be aged under 18 on September 1, 1983.
- (3) Closing date for competition entries is September 1, 1983.
- (4) The judges' decision is final.
- (5) No employees of Sunshine Publications Ltd, or their families, will be eligible to enter.



Screen Dump by A Piper

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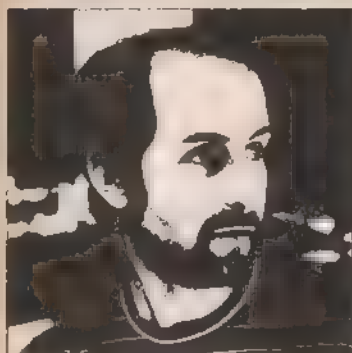
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Tony Bridge's Adventure Corner



Adventure clues

Having returned from a couple of weeks sunbathing on a beach at the end of Europe, I find a stack of mail about to reach the ceiling! So, let's have a good old round-up of a sizeable portion of it.

The ongoing saga of the Oric adventure *Zodiac* from Tansoft, takes a new turn this week. Just a couple of weeks after W J Bailey had written to tell me that I Fletcher couldn't possibly have found 10 signs, half of them being red herrings, he has written again. This time his letter starts: "Contrary to my previous letter..."

So, apologies are due to Mr (I think) Fletcher — rest assured that there are indeed 12 signs and you will need all of them in order to gain the sixth and final treasure, which will be revealed when you in a burst of glory.

Geoff Phillips, author of *The Zodiac*, has also written again, to confirm this, and also to tell me that there is, indeed, a red herring in the adventure. A Thompson, of Sheffield, seems to have found another, apart from the official Scarlet-Winged Heron (well, you work it out). A case of red herrings under the bed!

Incidentally, a lot of people have asked when *The Hobbit* will appear on the Oric — well, the news is that late September is the projected release date. Now you Oric owners have a real treat to look forward to — and let's hope that Melbourne House have used the time to learn how to spell *Adventure!*

Straight on now to the *Hobbit Hall of Fame*, and the people who have recently completed the "Adventure of Adventures":

Ted King
Peter Gleed
Richard Shaw
Humby
Bill Longley
Martyn Sudworth

Bill Longley (who seems to crop up all over the place!), would like me to pass on a tip that might save many struggling Bilbos a lot of time — "wear the magic ring when examining the Magic Door in the Elvking's Halls".

A lot of people are still, like Alex Delcado of NW8, having trouble with that pesky Goblin's Dungeon. Alex, we covered all that in PCW No 29! But, to recap very

briefly, you must follow the program's advice, and ask a friend to help. Stuart Alder wants the Bard to kill the Dragon, as in the book. Try killing the Dragon before collecting the treasure, Stuart!

R W Humby, also from the HHOF, brings a couple of new *Hobbitbugs* to our attention. If you have your ZX printer attached and type *Jump* while in the Wood Elf's Dungeon, then the program will crash, and the printer continuously *Print* out Run, Run, Run... (maybe that's a hint from the computer's subconscious). The other bug is not so serious — when the player is in the barrel in the Wood Elf's cellar, and types *Open*, providing he/she hasn't previously entered Beorn's cupboard, the program will then reply "you see an open cupboard — it is food" R W doesn't tell me if you can then *Take* and *eat* the food, but it will make for an interesting experiment when I'm less busy!

Many of the people who let me know of their progress in various adventures send along maps and responses they've given while playing. Jim Clavier, whose name appeared in the HHOF a few weeks ago, has kindly sent me a beautifully-produced solution to *The Hobbit*, which is a real labour of love, and most impressive. In common with other adventurers, he has also given me lots of tips on solving the game. I can't print all these at once, but rather, they slowly come out over the weeks in answer to all the pleas for help that I get.

This prompts me to give a few words of encouragement to anybody currently stuck fast in an adventure. I get many letters saying, in essence, "I'm fed up with this game — I can't get anywhere and am seriously thinking of giving up adventures for good". But then the next letter will say "For weeks I struggled over a certain

point, and suddenly all became clear and I was on to the next location". All I can add is, adventures are meant to be hard problems to solve, and if you read this column regularly, you should eventually pick up some clues for your adventure.

To complete our look at *The Hobbit* (for this week), Rajesh Patel of Oldham has asked me several questions. The one regarding *The Hobbit*, that I can answer is "How do I get past the bulbous eyes on the Forest Road after collecting the Treasure, and of what use is the Magic Door?" I'll use the letter-transposing trick that featured in the column some weeks ago. Starting at the second letter of the group, read off every alternate letter — when you get to the end, you must return to the first letter, and repeat the process. This should be a slight obstacle to those adventurers who don't want to see the solution just yet!

To get along the Forest Road:

TWHAETNWEASITT

And at the Magic Door:

EWDEOARRRWIANIGTETXHAEMNI
GNO

Finally this week, regular readers may like to know that I've really managed to collect one of the rings in the arcade adventure *The Halls of Things*, from Crystal Computing. Contrary to my expectations, no trumpets sounded, no flags waved, in fact it was rather anticlimactic, but I did gain 1000 points for the achievement, which made poor old Kickaha's hi-score of 100 seem positively puny!

There are, of course, several more rings to get before I can progress to the ultimate level — but I'll enjoy every minute of the quest! On the subject of Hi-Scores, incidentally, wouldn't it be nice if more software writers would give the player a *Save* routine for arcade scores? ■

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ON AND OFF

D J Mills, of Farm Avenue, Chislehurst, Kent, writes:

Q I don't know if you can help me, but I remember seeing some while ago a device that allowed any computer to control some ordinary 13 amp plug sockets. This would enable me to turn lights on and off, etc. I took the details at the time, but rather stupidly I have lost them. Can you tell me who to contact? By the way my computer is a BBC A.

A I know the feeling. I have lost count of the number of names and addresses I have noted down and subsequently mislaid. I think the company you are looking for is S J Research. They can be found at Phillip Spence Jones Associates Ltd, 108 Mill Road, Cambridge CB1 2BD.

SPEED MEASURE

Stephen Jones of Walsall, writes:

Q I find the slowness of my ZX81 annoying. Is there any way to find out how fast a micro is? Is the speed of a micro measured in KHz?

A Speed is relative in that a ZX81, for example, will not perform as many functions in the same time as another computer. The only way you can measure the speed on the computer is to set several computers the same task and see how long they take. The sort of test program needed would be like the one following:

```
10 FOR Z = 1 TO 50
20 PRINT Z
30 CLS
40 NEXT Z
```

This takes about 40 seconds in Slow and about 11 seconds in Fast. Run this on other

micros that use Basic and it will show how well the ZX81 compares against other machines. However, a range of tests would have to be done, as each micro has its own strengths and weaknesses.

The speed of a processor measured in KHz, does affect the speed of a computer, but this is not the whole story. On a Z80 chip, for example, half the time is spent Refreshing the memory. On say a 6502 the relevant register does not exist — it has a special chip, which leaves the processor more time to do other things.

Speed also depends on how each computer uses the CPU. An operation that takes eight instructions to execute on one computer, might only take four on another computer, using the same CPU and executing the same Basic command. It boils down to how each individual computer is set up, so the fastest time might not always be the fastest to do things.

SCREENS FUNCTION

David John McClanlon of Highlands Road, Bromley Cross, Bolton, writes:

Q How do I use the Screens function in a game such as Space Invaders? I have tried Screens (x,y) = " " Then but it does not work. Could you please tell me the formula on an x/y basis to convert Plot x,y to Print x,y.

A Your problem with Screens seems to be a question of syntax. You have forgotten the # and you do not need the inverted commas. Screens returns a numeric value between 32 and 127 only, because it will only read the conventional Ascii values, so such things as block graphics or user defined graphics cannot normally be read.

The correct form of the line you have above would be: `# Screens (x,y) = n`. Then, to use user defined graphics with this command, you would have to fool the computer into thinking that they started at Code 32.

I am not sure what you are getting at in your second question, because Print and Plot have very different resolutions and the numbering of the x

axis is different, running from 0 at the top of the screen in Print mode, while 0 is at the bottom in Plot mode. The dimensions in Print are 22 x 32, whilst those of a Plot screen are 176 x 255.

8K MEMORY

Julie Hancock of Purser Road, Northampton, writes:

Q I have a question about computer memory. I recently purchased an 8K memory expansion for my Vic20 and discovered, to my dismay, that programs written for the unexpanded memory no longer run with the cartridge plugged in. Because of this, a re-location program must be used for all memory expansion below 8K.

In the light of this, I would like to know if a similar problem arises with the 16K and 48K Spectrum, in the same way that it does with the 1K and 16K ZX81. I would like to know as I intend to buy a 48K Spectrum soon and I would like all 16K programs to run on it without having to convert them.

A This is a problem that is concerned with the way that the Vic20 and the Spectrum lay out their memory maps. If the onboard Ram on the Vic20 exceeds 8K, then it no longer fits into the bottom 8K block, so a certain amount of re-shuffling has to be done by the system.

When you have more than 8K on the Vic20, then the screen is moved so that it occupies the 4K between 4096 and 8191. The system variables stay at the bottom, but all the user Ram will start at 8192 and work up from there. Just why Commodore adopted this memory layout is best known to them.

This problem does not occur with the Spectrum, since the memory layout is a lot more straightforward. The user available Ram is 'in the middle' — the program works up, and the variables work down.

into the space. This is true whether it is a 9K user available space, as on the 16K Spectrum, or a 40K user available space, as on the 48K Spectrum. It is only in rare cases, such as lowering Ram-top, that there might be problems. If these do occur, then the memory map in the manual should be able to help you.

X/Y PLOTTER

Sukhbir Singh of Mulben Crescent, Glasgow, writes:

Q Having recently got bored with computer games for my ZX Spectrum I decided to buy an I/O board. To put it to use, I have built myself an x/y plotter. The principle is simple, a motor driving a vertical carriage. A pen is inserted where both axes meet.

The problem I have is how to change the direction of the motors. I know a number of ways of doing this mechanically, but these are of no use. I need it done electronically. Can you help?

A It is good to see that someone who has got bored with games chooses to develop his skills rather than moan about software and I wish you every success. I had a word with Stephen Adams and this is what he came up with.

You will have to use D/C, because A/C cannot be reversed. The best option is a pair of transistors acting alternately, one in each direction of the current.

One wire would need to be connected to the motor and the other to 0 volts. Obviously, they would not be wired to each other. The wiring would also need to be reversed, so where one would have a wired to 0 and b to the live voltage, the other would have a as the live line and b as the 0.

You would then have to use the output port to turn one or other of the circuits on, depending on which direction you wanted to move the plotter.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem Peek it to Ian Beardsmore and every week he will Poke back as many answers as he can. The address is Peek & Poke, PCW, 12-13 Little Newport Street, London WC2R 3LD.

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BBC MODEL B + books, £380, also wanted the A-B designs graphics program Tel: 090567 444 (ask for Mo)

ACORN ATOM, fully expanded and Atom Matic book chess program and magazines £70 only Tel: (0407) 810689

ACORN ATOM, 15K Ram, five volt power supply + manuals - leads + various business and games software, only £70 Tel: 061 7908151 (after 6.30 pm)

ACORN ATOM, 12K + 12K + 4K floating point Rom power unit, all leads etc. lots of Rom software books, games etc. all in mint condition and under one year old worth £370 will offer for £175 White to Tel: Longdale Road, Southbourne, Bournemouth Dorset

Commodores for sale

VIC20, cassette deck, £40 software, books, magazines, guarantee, £150 only Tel: East Ghinstead 23814 after 5 pm

VIC + C2N - 16K and 3K expansion units + well over £1,000 software (mainly games) joystick two game cartridges adventures some educational software and magazines value approximately £1,400 £345 only Tel: (08956) 38564

VIC20 ADVENTURE CARTRIDGE to swap Tel: 952-4749 (after 4 pm)

VIC20 + cassette deck + programs, £100 Tel: Romford 21687 (after 5 pm)

VIC20 + C20 CASSETTE RECORDER, introduction to Basic Part I, £55-worth of games, £125 of swap 48K Spectrum with cassette Tel: 0226-744 824

VIC20 + C2N CASSETTE DECK, £80-worth of cartridges books etc. £120 Tel: 0425-53581

VIC20 + C2N CASSETTE UNIT, programmers aid, seven games + carry-case and Joystick £200 Tel: 01-466 1753

VIC20, boxed - cassette + machine code monitor + software, £80 only Tel: Penzance 66451

VIC20, £70, 16K Ram £40 super expander, machine code monitor, programmers aid, £20 each Tel: 310-4031

VIC20 CASSETTE UNIT, introduction to Basic Vic Revealed + cartridges, cost £270, will accept £150 Tel: Northwich 6605 77445

COMMODORE VIC20 with disc drive to swap for a Commodore 64 or BBC Model B Tel: Studdington 5238

VIC20 WITH CASSETTE UNIT JOY-STICK + programmers reference guide + nine cassettes, £130 only Tel: 0472 692945

VIC20 - introduction to Basic Part I, cassette recorder, machine code monitor super expander, programmers aid and 16K Ram pack four-slot MB speech synthesiser, books, dust cover, £240 only Tel: 054-32 53344

VIC20 WITH C2N TAPE UNIT, 16K Ram cartridge, light pen, machine code cartridge, reference guide and dust covers, all boxed as new, £110 Tel: 01-399 2274

VIC 16K RAM PACK and cartridges for sale Tel: (08956) 38564

COM PET 8032 + disk drive 4040, offers Tel: Leighton Buzzard 371713 evenings.

VIC20 + 3K Ram + Sargon Chess, £110 only Tel: Tonbridge (0732) 361920

COMMODORE VIC20 + cassette, immaculate, £115 only Tel: 959 5267 (after 6 pm)

VIC20, sell for £75 Tel: Northampton 402750

VIC20 with cassette, joystick and Golf cartridge - PRG and cassette, £150 only Tel: 0625 402049

VIC20 CASSETTES, 32, from £3 to £8 each Tel: 031-661 7477 (Private sale.)

VIC20 plus C2N plus Ram and game, £110 only, boxed Tel: 061-7967144 after 6 pm (Manchester area)

COMMODORE 64 plus C2N cassette unit plus introduction to Basic plus manual £250 As new Tel: Warborough (Oxford) 8782

VIC20 plus C2N cassette deck plus 16K Ram and seven cartridge games, £150 Tel: Marlow 317818 after 6 pm

COMMODORE 64K, computer plus C2N cassette unit, only 3 months old, £250 Tel: Tonbridge (Kent) 357988

VIC20 - cassette deck and over 100 games + joystick + five cartridges, three lot 8K + programs reference guide book + many magazines, cost price over £500 sells for £325 only. Write to Mr L. Tate, Essex Denman Road, Canvey Island, Essex

VIC20 SWITCHBOARD, 16K joystick, software, cartridges, books, manuals and other accessories, fully boxed and in perfect condition £250 only Tel: 0442 58200

For sale

DRAGON OWNER wishes to swap cassettes Tel: Gary, Leicester (0533) 608212

NASCOM 1 32K GRAPHICS, Ram Basic Basic assembler and an ASR Teletype 33, £180 Tel: 0272 733948

MICROPROFESSION II plus large keyboard including two plug-in modules, eight cassette games, one printer cable, one joystick. Hardly used, as new, fantastic value only £199 Tel: 061-366 8223

INGERSOLL MULTI-COLOUR SPORT TV GAME, in colour with 10 games to play £15 to £20 Tel: Billingham 551048 after 4 pm, for Peter

ZX81 1K plus 14in black and white TV, swap for ZX Spectrum plus some cash. Tel: Burch Health 55591

ATARI VCS, nine cartridges, keyboard controllers. Hardly used, worth £300, £110 only Tel: 01-337 8080 after 5 pm

ATARI VCS with 20 cartridges. Good condition £120 only Tel: South Benfleet (03745) 52061

ATARI 400, 32K plus Basic and program recorder plus 100 programs including Star Raiders, £300 only Tel: 01-280 7028

ATARI 400, 32K with Basic cartridge plus program recorder plus games and joystick £175 only Tel: 0963 297205

ATARI VCS, mint condition plus eight brand new cassettes with joysticks and paddles, £120 Tel: (0842) 214282

LYNX 48K, in original packaging, £170 Tel: Huntingdon (0480) 215557 (evenings and weekends)

BBC MODEL B, only nine months old and hardly used + word processing chip in it £350 Tel: Chelmsford 381294

VIDEO MASTER CHESS CHAMPION, in good condition, £100 Tel: 200 5860

SWAP ASTEROIDS for the Vic 23.5K, for Commodore Vic20 race cassette (private sale) 0538 350460

VIC20 CARTRIDGES, Omega Race, £10, Jolly Monsters, £8, and Allen, £5 (private sale) Tel: Oxford (0865) 247638 (ask for Chris)

INTELLIVISION, £86 + free Locke Chase and Starstrike, Tel: Stevenage 355583

ORIC (48K), excellent condition, with cassette machine, Basic and Forth, all leads, manual, etc. included bargain, £115 Tel: Longfield 5159

DURST M605 with colour lead (all worth over £1,000). Durst RGP20 processor. Printex ME Super + 20mm, 80-200mm lenses. Jobo CPE 2 processor, other accessories. swap for BBC Model B or a Commodore 64 with the printer and disc if possible + Tel: 01-561 4801

LYNX 48K, mint condition, hardly ever used, £175. Tel: Swansea (0792) 891578

SEIKOSHA GP 100A, graphic printer, six weeks old, mint condition, all boxes + manuals, must be seen, £150 ono. Tel: Chesterfield 36935.

SWAP SPECTRUM CASSETTES (ties include Penetrator, TimeGate). Tel: Potters Bar 50498 (private swap).

13K JUPITER ACE + some software + leads and manual, good condition, £70. Tel: 0204 50505.

UK101, expanded 8K version, fully boxed, with manuals + all leads and power supply, only £60. Tel: Bideford 79732

SENSORY 8 FOR SALE, good condition, worth £165, will sell for £125 ono. Tel: Doncaster 49475 (before 5 pm).

TRS80 32K colour computer, plus software, plug-in cartridge, £300; also ZX81 with 16K Ram pack and software, £48. Tel: Leyland 54753 (after 5 pm).

6502 MACHINE CODE for beginners, sell at £4 or swap for 7809 assembly language programming Southampton (0704) 68894.

T199/4A with joysticks and tape table, as new, £80. Tel: 01-516 7962.

TEXAS plus extended Basic plus speech synthesiser music maker video chess, joysticks and games tape recorder and books. All worth £350 new, will sell for £250 or reasonable offer. Tel: Chesham 785052

MATTERINTELEVISION with soccer cartridge, £85, 10 other cartridges from £10 each. Tel: 0726 63501

INGERSOL multi-colour sport TV game (10 games - each game has a choice of two colours for the background), swap for ZX81 1K, with books and leads or sell for £20. Tel: Billingham 551049 after 4 pm and ask for Peter

ARFON EXPANSION UNIT, with lead for the Vic20 computer, £85 ono. Tel: 01-850 9701

MICROTAN 65 with tanex and x-box 10K Basic, checky graphics, keyboard, cassette recorder manual, book and game tape £230 ono. Tel: (0920) 870394

VIC20 8K plus Seikosha GP100 VC printer, with paper and tape deck, joystick Vic Revealed, Programmers Reference Guide, over 25 games, all in excellent condition, worth £650, sell for £375 ono. Tel: Balcombe 532

VIC20 with cassette deck and 3, 8 and 16K Ram packs, programmers aid and machine code monitor plus joystick and paddle plus four cartridges plus £100 worth cassette software, books include the Vic Revealed, Programmers Reference Guide, Introduction to Basic Parts 1 and 2. All worth £665 sell for £290 (still under guarantee.) Tel: 01-892 8768

COMMODORE VIC20, C2N cassette deck, 16K Ram pack, joystick, six cartridges. Many cassette games, Introduction to Basic, Part 1, Vic Revealed. Must sell, all offers considered. Tel: 0702 201637

SHARP MZ 80K, 48K, complete with several languages including Pascal. Forth, Zen assembler and word processor. £250. Tel: Cheltenham (0242) 25091

PHILIPS G7000 - nine cartridges (three of them expanded memory), swap for Vic20 and tape recorder or sell for £110 ono. Tel: Northampton 846020

SWAP ANY BBC PROGRAM (most Acornsoft titles) for Snooker or Invaders. Tel: King's Lynn (0553) 62888 (6 pm) Private swap

FOR SALE: MASTER MACHINE CODE on the ZX81 cost £7.50, a bargain at £3.50. Tel: Waltham Cross 28173.

LYNX 48K, as new, £150. Tel: 01-445 1282 (evenings)

TANDY TRS 80, Model 1 Level 2, 16K, VDU, cassette recorder three manuals, use a group newsletters, games and magazines £150 ono. Tel: 0785 823499

SPECTRUM AND BBC SOFTWARE, all originals by Melba House, Pision and Bug Bite. Tel: 0442 54288 (ask for John) (private sale)

LYNX 48K with leads and manual quick sale, £160. Tel: 031 4494698

VIDEO GENI EG3003 with programming book and black-white monitor £180 ono. Tel: Hoddeston (0992) 46862 (after 8 pm)

SHARP PC 120M - three manuals (one beginners), cassette interface, £45. Write to: 24 Baby Street, Belfast BT7 2GY

PARSET GAMES CARTRIDGE for P199, £10 ono. Tel: 041 5571533

COLOUR GENIE with joysticks games, etc. total cost £300+ all as new, £150. Tel: Trowbridge Wilts 3965

SEIKOSHA UP100A PRINTER, six weeks old, mint, boxed + manuals £150 ono. Tel: Chesterfield 36935

MATTEL INTELLIVISION, five cartridges, any reasonable offer. Tel: King's Lynn 62234 (Juslin)

JUPITER ACE, internal 19K, leaving edge connector free + two cassettes, £100 ono. Tel: 01-668 2779

PHILIPS G7000 VIDEO PACK + two cartridges, still under guarantee, £60 ono. Tel: Wallingford 35849

Wanted

WANTED: ZX80 in good condition. Tel: 061-449 8030

WANTED: COMMODORE 64 software 01-574 4122

WANTED: A COMPETITION PRO JOYSTICK or a similar quality joystick in exchange for 20 or more games of your choice. Tel: 041-557 1533

WANTED: BBC MODEL A, Call Carluke 73184

WANTED: ATARI DISC DRIVE, will pay up to £150. Tel: 0225 742777 (ask for Mark, after 6.30 pm)

WANTED: BBC MODEL B in working order. Tel: Durham (0385) 87254.

WANTED: BBC MODEL B in good condition, with or without software, any offers considered. Tel: 01-590 8301

WANTED: ZX81 1K + manuals and leads, willing to pay £20 ono. Tel: Camberley 32506

CRUISING & BLIND ALLEY

Cruising
The winner of last month's competition with a score of 43552 was Carl Doran of Skidby Mill, North Humberside. Entries for this month's competition close on August 31.

Blind Alley
The highest score sent in so far this month is 99955 from I Wilson of Thornaby, Stockton. Entries for this month's competition close on August 31.

ADVENTURE HELPLINE

Micro ZX Spectrum

Adventure The Hobbit

Problem I cannot safely pass through the trap-door in the Elvenking's Halls. I am invariably dashed against the strong portcullis in the forest river below.

Name Graeme Chisholm

Address 59 Abbotsgrove Road, Grangemouth, Shirlingshire, Scotland

Micro Spectrum 48K

Adventure Adventure D

(Espionage Island by Artic)

Problem How do you use the boat or use torch in dark corner of aeroplane or get across the crevasse or get woman's help?

Name Carl Inwood

Address 51 Greenfields Road, Sheffield, Waball, West Midlands WS4 1RT

Micro 16 ZX Spectrum

Adventure Adventure A Planet of Death

(Artic)

Problem How to get a stalactite from the roof of the cave with the drawing - Is there an exit through the maze?

Name Master Adam J. Wray

Address 14 Watsfield Avenue, Kendal, Cumbria LA 9 5JJ
Tel: Kendal 25528

Micro ZX Spectrum (16K)

Adventure Artic Planet of Death

Problem How to get out of the spaceship and what to do after that, having unlocked the door?

Name Master Adam J. Wray
Address 14 Watsfield Avenue, Kendal, Cumbria LA 9 5JJ
Tel: Kendal 25528

Micro Dragon 32

Adventure Backo-In for Tandy Colour

Problem Out of a possible 50 points I can only get 20 after collecting everything available - unless there is a way to cross the pit and open the door - that I cannot find - exposing a further maze

Name Andy Marsh

Address 41 Central Avenue, Bury BL 9 9LX

Micro Spectrum 48K

Adventure Hobbit

Problem Having collected the treasure I cannot find a way back. Please help! Baby coming soon!

Name Eric Adamson

Address 9 Railway Cottages, Carlton Alnott, Thirsk, North Yorks

Micro Spectrum

Adventure Ship of Doom

Problem Keeps killing me for no apparent reason

Name R. Lyford

Address 1 Churchside, Chet, Hemel Hempstead, Herts

Micro Dragon 32

Adventure Madness and the Minotaur

Problem Unable to locate mushroom

Name M. R. Hamzahud

Address 18 Maston Close, Middlesbrough, Cleveland TS5 7JR

RED SHIFT

APOCALYPSE

A multi-player game of strategy, tactics, diplomacy designed to be expanded and miniaturised. The game traces YOUR INFLUENCE. Each game concerns four maps. The BBC version is over 80K of program and data - the Spectrum version over 50K.

PLAY IT BEFORE YOU BUY IT!

£9.95

plus 10% p.p.h.



Apocalypse

THE WAR GAME

SPECTRUM 48k

BBC Model B

TO BE RELEASED EARLY AUGUST

Coming soon - VOLUME 1 & 2

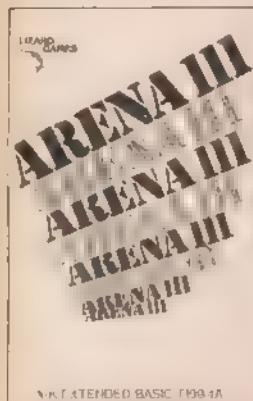
VOLUME 1: A multi-player game of strategy, tactics, diplomacy designed to be expanded and miniaturised. The game traces YOUR INFLUENCE. Each game concerns four maps. The BBC version is over 80K of program and data - the Spectrum version over 50K.

VOLUME 2: A multi-player game of strategy, tactics, diplomacy designed to be expanded and miniaturised. The game traces YOUR INFLUENCE. Each game concerns four maps. The BBC version is over 80K of program and data - the Spectrum version over 50K.



NEW RELEASES

A RARITY



Arena III is that rarest of all animals, a game for the T199 4A.

Wonderful as many of the computer's specifications are, independent software for the Texas is almost non-existent. Lizard Games seem to be one of the very few houses specialising in Texas programs.

On *Arena III* your mission is to claim the newly discovered planet Argar for the Federation.

This involves travelling through the Zalta galaxy which is patrolled by Galactic raiders bent on self-destruction. When you arrive tired and exhausted over Argar you must clear a landing strip and descend, avoiding the meteor storms, to plant the Federation flag.

Program *Arena III*
Price £8
Micro T199 4A
Supplier Lizard Games
14 Bridgewood
Brookside
Fellord
Shropshire

ARCADE

The animated graphic adventure has to be the next objective for major software companies.

Quicksilver's *Nadom* gives you arcade like controls, left, right, up, down and fire (strike), but in an adventure setting.

The screen displays a bleak alien landscape at the end of which are three cosmic gates — you must fight off the va-

rious evil monsters that live in each domain and pass through one of the gates.

Like adventures, there are various objects you can pick up along the way and mazes where you can get lost; like arcade games you must be quick on the keys to avoid or kill the nasties — what to call it? An arcade game? An adventure?

Program *Nadom*
Price £6.95
Micro Spectrum 48K
Supplier Quicksilver Ltd
13 Palmerston Road
Southampton
SO11 1LC

MULTI-LEVEL

Slowly, the larger companies are losing interest in the ZX81 machine to concentrate on its more sophisticated brother. But, now software is still appearing from some of the smaller firms.

Such a tape comes from Geoff Lee — a games selection with a multi-level version of *Awari*, called *Stones*, and a card puzzle called *Open Patience*.

Program *Tape 1*
Price £4.50
Micro ZX81 (16K)
Supplier Geoff Lee
5 Westbourne Road
Islington
London N7

HISTORY



Battle of Britain is a Kingdom-type program in which you fight off the deadly huns with your few brave lads.

Up to 12 people can play the

game, each taking charge of a city and defending it from attacks by scrambling fighter squadrons or electing to use vital raw materials to make more fighters.

Depending on how many adversaries you choose to take on, the game can last anything from a couple of hours to several days. The objective is, of course, to repeat history and send the boudiers back across the border leaving this sceptered isle free once more for... etc, etc.

Program *Battle of Britain*
Price £9.95
Micro Lynx, Sirius, Vic20
(16K), ZX81, Spectrum
Supplier Maincomp
12 Cambridge Gate
Regents Park
London NW1 4JN

ZOMBIES

Realm of the Undead is an Adventure — an arcade game/adventure game hybrid.

Your task is to rescue villagers trapped by the Dark Lord. You do this by collecting garlic and avoiding vampires, tarantulas and zombies.

The idea is to mix some of the themes and problem solving of an adventure with the graphics and speed of an arcade game.

Program *Realm of the Undead*
Price £6.95
Micro Spectrum 48K
Supplier Express Programmes
Company
Express House
City Road
Bradford
West Yorkshire BD1
5LR

SAME NAME

Return of the Jedi is an arcade type game for the Spectrum 48K.

The title, as you see, is cunningly disguised so you won't realise the game has anything to do with the film of almost the same name.

The object of the game is to destroy Darth Vader without also knocking R2D2 on the noddle. Together with the game, is the promise of a voucher worth £1 off any of the company's other products — if you can beat the high score of 72000.

Program *Return of the Jedi*
Price £5
Micro Spectrum 48K
Supplier MK Circuits
63 Felstead Road
Grimshy
S Hammerside

ISLAND RACE

The Island is a graphics adventure for the Commodore 64. The setting is a round-the-world motorbike race. This particular leg of the race, the program is set on The Island. The suppliers intend to continue the story with subsequent releases (*The Island II?*).

Program *The Island*
Price £10
Micro Commodore 64
Supplier Superb Software
4b Oval Road
Camden
London NW1

DOTS



Android Attack is not an educational program for the BBC. It neither teaches recognition skills nor vocabulary, and you will not be able to learn how to tell the time from it.

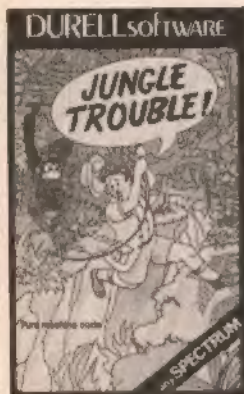
What you can do is kill androids whilst running round a maze.

Gradually your energy decreases and you must eat dots and other things that appear in the maze to restore it.

Program *Android Attack*
Price £8.95
Micro BBC (32K)
Supplier Computer Concepts
16 Wayside
Chipperfield
Hertfordshire WD4 9JJ

NEW RELEASES

SAINTLY HALO



If wit counts for anything, then Durell Software is on to a winner with *Jungle Trouble*.

Although the game itself is addictive, as you try to move your little man across stepping stones (avoiding the crocodile), chopping down trees and swinging him over burning pits, it is the little touches that make the game.

As you try to chop down the trees, a monkey comes up to you and tries to steal your axe. If he manages it, the little man stands there with a forlorn expression looking helpless.

If, mistiming his jumps, the man tumbles into the swamp and is eaten by the crocodile, a little halo appears — fans of *The Saint* will soon see the joke.

Program *Jungle Trouble*
Price £5.50
Micro Spectrum 16/48K
Supplier Durell Software
Castle Lodge
Castle Green
Taunton TA4 1AB

SPRITELY

One of the reasons people like *Ultimate Play the Game* are able to get such good graphics out of the Spectrum is that they have written Sprite routines for it.

Sprite handling (moveable pre-defined graphics shapes) is a facility that comes as standard on some other machinery like the IT or Commodore 64.

Now 48K *Sprite* makes them available for people who aren't expert enough at machine code to write their own graphics routines.

The program comprises a Sprite generator program which allows you to construct sprites in the same way as you construct user-defined graphics — saving the date on tape for your own programs. The second part of the program

is a machine-code routine to *Poke* the data on to the screen.

Program 48K *Sprite*
Price £4.70
Micro Spectrum 48K
Supplier B Sides
4 Willesden Road
Cefn Glas
Bridgend
South Wales

DARTS

No prizes for guessing that *One Hundred and Eighty* is a computer version of darts, that perennial pub and garage (you never played darts in the garage — where were you?) favourite.

Four games are available including *Round-the-Clock* and 301.

The screen displays both the dart board and a side-on view of the passage of the dart which you guide to its target.

There is a special reward, should you achieve the magical one hundred and eighty score.

Program *One Hundred and Eighty*
Price £6.90
Micro BBC
Supplier A & F Software
830 Hyde Road
Manchester M18 7JD

DYNAMITE

California Goldrush is the title of an intriguing sounding game from Anik. You must move Prospector Jake around his 24 territories, claiming each one by surrounding it with a fence.

The problem is that the surrounding Indians don't much like Jake and they get nastier and nastier in their defence of their land. Jake, in his turn, can defend himself by dropping sticks of dynamite at various points — this causes a rock fall which temporarily blocks the Indians' path.

The game will be available for the Commodore 64, Spectrum 48K and Dragon 32.

Program *California Goldrush*
Price £7.95
Micro CBM 64/Spectrum 48K/Dragon
Supplier Anik Microsystems
30 Kingscroft Court
Bellingham
Northampton
NN3 4BH

NOT A GAME



You may remember a few weeks back I warned you that Dragon programs were turning educational. More evidence for this comes from Tiger Software, whose *The Tiger Grand Prix* is not all it seems.

You buy this cassette with a colour cover depicting a racing car, imagining yourself zooming, on the track, your joystick fingers twitch and what do you discover? Your parents are delighted — it's an educational game!

Still, maybe there are compensations. The computer shows two cars on a racing track — you must move the cars around the board by throwing dice and answering questions. Danger lurks in the form of gremlins who will chase and catch you if you answer the questions wrongly. The game (sorry, educational program) uses all 32K of the memory and the questions are intended to cover various age ranges from seven to 16.

Program *The Tiger Grand Prix*
Price £7.95
Micro Dragon 32
Supplier Tiger Software
63 Devonshire Street
Montiswearmouth
Sunderland
Tyne & Wear

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

Funny it doesn't seem to be the sort of game you get tired of...



Ziggurat



Oh to C the C

Back to languages again — this week C. The origins of C lie somewhere in BCPL.

BCPL, which I have discussed before, is like Fortran in that it is a typeless language. It is "low-level" in its ability to manipulate the basic elements of a computer's memory and processor, and "high level" in that it has sophisticated control structures and can be used without too great tedium. So much for BCPL.

From that language came B. B was used to develop the first Unix system on the PDP-7 (by Ken Thompson in 1970).

Like BCPL, in B the only data type is the machine word, with access to other kinds of objects being via operators or function calls. For example, if a character operator is used, it means the word to be used as a character.

The Unix operating system is becoming steadily more popular on computers other than 8-bit machines. The chip manufacturers Motorola and Intel are both promoting Unix for their 16-bit and 32-bit products.

The key to present versions of Unix is C. Although the first version of Unix was written in B, it has produced C and it has spawned the current Unix systems.

C, since it derived partly from B, is similar to BCPL in some respects. But, C is not just another variant of BCPL. It is more human in that it has certain fundamental data objects which go beyond the mere machine-word (as a Fortran, I am not always too sure whether that is an unmixed blessing).

These data objects are characters, integers (of several sizes, and floating-point numbers (the value of 3/5 is 0, because 3 and 5 are created as integers, but 3.0/5.0 is 0.6). On top of these

basic structures are derived-types using pointers, as well as arrays, and more complex structures.

Almost all Unix software is written in C. B W Kernigham and D M Ritchie, in *The C Programming Language*, note that of the 13000 lines of system code in Unix only about 800 lines are written in assembler.

C programs tend to be sufficiently efficient to make the writing of machine code programs superfluous. C offers straightforward control structures: tests, loops, grouping, and sub-routines, but nothing beyond that — such as multi-programming, parallel operations, and similar.

C is relatively small: a compiler for C can be simple and compact (as with Fortran) and can be easily written.

As a language, C reflects the capabilities of current computers — it is not waiting for any fifth generation to make it fully viable (which seems to be the case with Prolog). Kernigham and Ritchie claim that C is so efficient that one of them (who?) does not know, and has not needed to know, the PDP-11 assembly language for the original Unix host machine.

Want to see a program?

```
main()
{ printf("Ziggle RATIn"); }
```

A C program — however large or small — is composed of one or more functions, which specify what has to be done. *Main* is a special function, like *Start* in BCPL, which has to appear in a C program.

The curly braces "{" and "}" enclose the body of the routine, and the ordinary parentheses "(" and ")" give a list of parameters. In this case *main* has no parameters.

Printf is a library function, with its parameter being "Ziggle RATIn". The strange symbol pair "\n" (which stands for one character) means newline. Powerful huh?

Try to work out what this function does.

```
FUNCTION(x)
int x;
{ int p;
  for (p = 1; x > 0; --x)
    p = p * x;
  return(p);
}
```

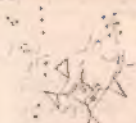
Answers next week. Note that C uses "=" rather than the "==" of Pascal, and Algol.

Boris Allan

Puzzle

A mystic property

Puzzle No 70



In line with many other stately homes, the seat of the Seventh Marquis of Mulberry has recently been opened to the public. Its grounds were landscaped by Capability Brown in 1763, under the direction of the eccentric Third Marquis.

This eccentricity was no doubt due in part to his overwhelming interest in the mystic property of numbers. As a result of which he directed that the four triangular flower beds, one at each corner of the house was to have the same number of yards in its perimeter, as it had square yards in its area.

This Capability found curious behaviour. It also posed him a problem until the Marquis showed him how to solve it. Eventually, he was able to design the flower beds such that each was a different size, and such that the sizes were to be the four smallest possible. What were their dimensions?

Solution to Puzzle No 65

The lowest six-figure number which still has the same number of figures after being divided by seven is 700000. The program begins with the number and tests it to see if it satisfies the conditions of the puzzle. If not the number is increased by seven, and the process repeated.

```
10 FOR Y=700000 TO 999999 STEP 7
20 LET X=Y/7
30 LET S=X*6
40 LET SS=STR$(X)
50 LET SS=STR$(S)
60 IF LEFT$(SS,3)=RIGHT$(SS,3) AND
RIGHT$(SS,3)=LEFT$(SS,3) THEN PRINT "Original
number="; Y; "Number/7="; X; "Number/7*6="; S;
70 NEXT Y
```

This gives answers of 999999, 142857 and 857142, respectively.

It is worth noting that 142857 is a funny number. Try multiplying it by different figures from 1 up and see what you get.

Winner of Puzzle No 65

The winner is: Norman Kaye, Park Drive, Warrington, Stoke-on-Trent, who receives £10.

Top 10

Top 10

Top 10

Top 10

- Atari**
- (2) Miner 2048er (Big Five!)
 - (1) Necromancer (Synapse)
 - (5) Preppie 2 (Adventure International)
 - (1) Combat Leader (SSB)
 - (1) Triad (Adventure International)
 - (9) Blue Max (Synapse)
 - (1) Pharaoh's Curse (Synapse)
 - (1) Diamonds (English Software)
 - (1) Crazy Kipper (English Software)
 - (4) The Blade of Backboole (Sirius)
- *Cartridge 132K Cassette 148K Disc
(Figures compiled by Calisto Computers Birmingham 021-542 6442)

- Vic20**
- (1) Arcade (Imagine)
 - (2) Wacky Waiters (Imagine)
 - (4) Cosmoids (Bug-Byte)
 - (1) Stargon II Chess (Commodore)
 - (3) Panic (Bug-Byte)
 - (1) Skyhawk (QuickSilva)
 - (5) Calcha Snatcha (Imagine)
 - (1) Cosmic Crunchers (Commodore)
 - (9) Escape MCP (Rabbit)
 - (7) Cyclons (Rabbit)
- *Cartridge
(Figures compiled by Boots & Co. London)

- Z801***
- (1) Space Raiders (Pison)
 - (2) Espionage Island (Artic)
 - (4) Flight Simulation (Pison)
 - (1) History (ICL)
 - (1) Geography (ICL)
 - (3) Football Manager (Addictive Games)
 - (5) 1K Games (Artic)
 - (7) Defender (QuickSilva)
 - (9) Fantasy Games (Pison)
 - (8) OS Schmilbe (QuickSilva)
- *All 16K except where shown. †Runs in 1K.
(Figures compiled by Boots & Co. London)

- Oregon**
- (2) The King (Microdeal)
 - (1) Space War (Microdeal)
 - (3) Talking Android Attack (Microdeal)
 - (5) Frogger (Microdeal)
 - (4) Night Flight (Satamander)
 - (6) Planet Invasion (Microdeal)
 - (9) Dragon Trek (Winterstar)
 - (8) Champions (Peaksoft)
 - (1) Morocco Grand Prix (Microdeal)
 - (7) Guitenberg Goes Walkabout (Microdeal)
- (Figures compiled by Boots & Co. London)




- Spectrum**
- (4) Flight Simulation (Pison)
 - (1) Jet Pac (Ultimate)
 - (1) Mad Martha (Microgen)
 - (3) Transylvanian Tower (Richard Shepherd)
 - (1) Super Spy (Richard Shepherd)
 - (5) Horace and the Spiders (Pison/Melbourne House)
 - (1) Manic Miner (Pison/Melbourne House)
 - (1) Test Match (Computer Rentals)
 - (1) Arcade (Imagine)
 - (1) Scrabble (Pison)
- *Requires 48K.
(Figures compiled by W H Smith & Sons)

- Books**
- (6) Complete Spectrum Reference Guide, Commodore
 - (1) Commodore 64 Programmers Reference Guide, Commodore
 - (2) Structured Programming with BBC Basic, Altherton
 - (1) Programming the 6809, Zaks
 - (5) Vic20 Programmers Reference Guide, Commodore
 - (1) Metronic Programming, Raydon
 - (7) Assembly Language Programming, Bimbaud
 - (1) BBC Micro book, McGraw
 - (1) Basic programming on the BBC Micro, Cryer
 - (4) Mastering the Vic20, Jones
- (Figures compiled by Watford Technical Books, Watford SG22 2324)
(Last week's positions in brackets)

- BBC***
- (1) Escape from Moonbase Alpha (Melbourne House)
 - (1) Painter (Commodore)
 - (1) Super Invaders (Howard)
 - (1) Danger UXB (Sybes)
 - (3) Snooker (Commodore)
 - (1) Philosophers Quest (Melbourne House)
 - (1) Alien Swirl (Macmillan)
 - (5) Countdown to Doom (Addison Wesley)
 - (9) Killer Gorilla (Prentice Hall)
 - (1) Model 8 only (Howard)
- (Figures compiled by Micro Management, Ipswich 0473 59181)

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 blank for DESPATCH NUMBER:

only this sort of letter can help....

Dear PiMan, please come back to work, spreading joy and happiness across the planet. I want to help, by sending you the enclosed program(s), for you to market. So here's a bug-free copy of my work, along with full documentation for my program(s), for EITHER a Spectrum OR Dragon OR Oric OR Commodore64 or BBC Micro, 'cos I realise that you aren't interested in other sorts of machines. I promise that I am free to offer you my work, that it is all original & my very own property, and I understand that it is a 20% Royalty that you are offering on all of my stuff that you sell. I would very much like to see my own program(s) advertised here on the back page of Popular Computing Weekly... along with your famous, but pathetically small range of products.

Yours sincerely

.....Because,.....

PIMAN

ON STRIKE

A deflated PiMan refused to appear on the back page this week. "I am fed up to the cavern of ivory trying to entertain the public and not getting a sausage in return from them," he snarled at our reporter - with the broken-nose Ivor Duff-Sinclair. "Salamander have started to imitate my spoof newspaper adverts, Virgin Games have pinched my idea of giving away music tracks on their cassettes, and what do I get in return nothing. The situation is critical and I'm not prepared to negotiate. I am DESPERATE for any original software to market, and I'm not running any more silly adverts until I receive some programs. And that's Final. Speaking on behalf of the National Association of Famous Fatties On Feature Film, (N.A.F.F. O.F.F.), the Piman pleaded with all programmers to get off their backsides and send him their original programs today. Not tomorrow. Today. "All I can offer in return," sobbed the pathetic former - cult, "is money."

